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We have some excellent news! Marcel Engelhardt joined the competition team as a partner on July 1st. Marcel is a very experienced procurement consultant, having held positions at Roland Berger, Drozak Consulting, and PwC. Marcel shares the competition team's passion for game theory, negotiation, and procurement optimization. After our time together at Drozak Consulting, we are happy that our paths have crossed again, and we look forward to many successful joint projects.

Game-theoretic negotiation methods regularly lead to above-average results in purchasing and sales. However, accompanying procurement processes cannot sustainably anchor this methodology within companies. Although on-the-job training is an indispensable component, a broader approach is also required to institutionalize the long-term approach in companies. Marcel Engelhardt describes how this can be done in his article "Anchoring Game Theory Methodology in Purchasing Organizations."

The following article discusses how to weaken competition in unintentional purchasing. A commonly used tool is the last-call option. This gives the bidder the right to accept a price that another bidder has (conditionally) accepted. From an expected value perspective, the last-call option typically results in a higher purchase price. Therefore, it should only be granted if the bidder offers significant concessions in return. The expected price increase due to a last-call option can be calculated, at least approximately, using a normal distribution.

As the summer comes to an end, vacations are at the top of many people's minds. A common game-theoretic problem in tourist areas is the poor quality of restaurants or the need for more restaurants in general. External indicators such as the number of visitors, the quality of the food pictures, or the friendliness of the staff are usually indicators of restaurants that could be better. These so-called "undesirable" restaurants are often just a result of the need for repeat customer interactions. While restaurants with recurring customer relationships prevail in areas with a larger, or at least a more stable population, acquiring a customer once in tourist areas can sometimes be challenging. This, unfortunately, often reduces the quality of the restaurant and its cuisine to a barely acceptable level. This problem can be solved by avoiding tourist areas or asking locals for recommendations. As repeat customers, they usually have a better overview. The one-time interaction problem can also be solved by using online review sites. Publicly visible reviews incentivize operators to improve the quality of their offerings and also encourages new patrons to try the restaurant. Despite an estimated 10% of Google reviews being fake, the widespread use of review sites has significantly improved the previously unfavorable dynamics of one-time interactions.

We wish all our readers, customers, and partners a wonderful summer!

Integrating Game Theory Methodology into Procurement Organizations

Marcel Engelhardt

Background

Game theory methods and negotiation approaches have been used in the private sector and public procurement for many years, usually with resounding success. In recent years, there has been an increase in ‚in-house solutions' that operate independently of external experts, particularly among automotive manufacturers. Despite the excellent results, only some companies are able to sustain these approaches without ongoing external support. They are not part of the standard methodology toolbox, and the purchasing organization is not set up for broad application (see also the article "Home-made competitive hurdles in purchasing" in this issue).

Typically, projects, where game theory is successfully applied, follow a similar pattern: external consultants introduce the methodology and drive implementation in individual procurement projects. When the consultancy contract expires, or no new contracts are awarded, the pilot projects remain in place. Procurement offices then return to traditional negotiation approaches, such as bilateral or multilateral face-to-face negotiations, as standard.

The elements of sustainable anchoring

We identify three essential elements for internally establishing game theory methods. First, organizational structures that allow a technique to be maintained even without a specific project reference must be created. This means that a demand for the method must be created regularly. Existing standards in purchasing organizations can often be integrated or aligned with these new methods. In particular, the product group strategy, which should be defined regularly anyway, should be designed so that, in the long term, more awards can be made concerning their suitability for game-theoretic, competitive negotiations. In the short term, all upcoming negotiations should be structured in a negotiation calendar and, above all, identified at an early stage. In this way, the application of game theory will at least not fail due to a lack of preparation time. This applies to the project business and the serial business's annual price negotiations. Both classic bilateral negotiations and the game theory approach to selection and planning must always be on an equal footing. Few purchasing organizations can ensure that competitive sourcing is seen as the "default solution" both in the standard procurement process and in the mindset of product group managers. Deviations from this default solution to classic negotiation must then be justified with the individual circumstances and not vice versa.

The second critical element in building an in-house solution is the systematic training of individual employees. On the one hand, this concerns the efficient and effective execution of a specific upcoming procurement process. On the other hand, know-how starts with identi-

fying negotiations that can be conducted with a competitive approach. As described above, processes and structures can make a valuable contribution. However, they must always be complemented by the assessment skills of the product group managers conducting the negotiations.

The ability to think about game theory—to understand 'strategic interactions'—is critical for successful implementation. For low to medium-complexity procurements, in-depth knowledge of game theory is generally not required. However, a basic understanding of game theory is essential in selecting the right building blocks from the standard kit for the individual procurement situation. Then, the crucial elements of RFx and negotiation design must be learned. Buyers must recognize the strengths and weaknesses of competitive situations, design the RFP meaningfully and market-driven, and understand the implications of the negotiation mechanism. Only then can a robust negotiation design be developed, usually consisting of a combination of the most common auction and information elements (e.g., Dutch auction with ranks). Finally, secondary competencies should be mentioned, i.e., project management, organization of the auction day, and softer success factors such as proper communication with suppliers.

The third and final element is practical implementation, which must be learned in several steps. In the beginning, there is always the more passive accompaniment of an assignment by an expert. This starting point usually corresponds to the constellation in a typical consulting project. The next step involves a role reversal, where the buyer takes an active role while receiving passive support from an expert. The buyer must now move from being the expert's debtor to being his own debtor, actively driving the procurement process from the driver's seat. Ideally, this setup must be repeated several times until the buyer can conduct less complex procurements independently.

The three elements described form a triangle of success that - flanked by successful change in management - can strengthen the game theory competence of any purchasing organization. In terms of practical implementation, this means that while external specialists continue to initiate and support pilot projects, the overall project is also geared toward structural implementation within the company at an early stage. The main advantage of this implementation via processes is that the knowledge is secured even if the external consultants leave or there is a fluctuation of knowledge carriers in the workforce.

It is important to emphasize that the procedure described needs to be revised to conduct complex auctions. This applies, for example, to competitive situations with strong asymmetries between suppliers, combinatorial elements, or deceitful behavior of market participants. These are usually so unique that in-depth game theory analysis is essential. In such cases, external consultants or internal experts from a Center of Excellence are still required, as the necessary expertise can rarely be built up alongside the product group manager's daily business.

Home-grown competitive barriers to effective purchasing

Marcel Engelhardt, Christoph Pfeiffer

Background

When asked about the most effective negotiation leverage, most purchasing experts will point to maximizing competition. One must analyze game theory in-depth to understand why competition is so essential in any purchasing negotiation. The explanation is simple: suppliers must make a trade-off between the probability of winning the contract while still trying to maximize their profit. The higher the bid price, the lower the likelihood of winning. The less confident a supplier is of winning the bid, the lower its profit margin. A (true) monopolist can focus primarily on profit maximization. Only when the profit margin reaches dimensions where the customer's business case no longer works does the realization of the sale itself become part of the consideration.

Successful negotiation on the edge of monopoly situations is often called supreme purchasing discipline. Dealing with true monopolies is not trivial and usually requires a great deal of cross-functional effort over a long period of time. At the other end of the spectrum are the more convenient negotiations, where you have many suppliers to pick and choose from. General competition alone ensures price optimization over time for less complex sourced goods. With greater complexity (and less direct comparability), mechanisms optimized by game theory can take over this task.

What is exciting, and the subject of this article, is the often-large discrepancy between the two borderline cases. Determining the degree of competition is often more challenging at first glance, as the sheer number of potential suppliers is a necessary first step but not a sufficient final step. On the one hand, competition is determined by the supply side, i.e., the market situation. On the other hand, there are also influences on the demand side in the form of purchasing practices, specifications, or anti-competitive behavior that affect the strategic bidding behavior of suppliers, which will be examined below.

Self-made barriers to competition - an example

In general, any rigid rule the purchasing department sets can be a potential barrier to competition. This is because rigid rules always mean the market is given a framework within which it must optimize itself. The market needs the opportunity to design the optimal framework itself. This can lead to a loss of efficiency. A concrete example of this is a previously defined sourcing strategy. A purchasing organization determines that strategic materials should always be procured from various sources, preferably with a similar volume share from each supplier. This makes sense from a risk management perspective: production is not immediately jeopardized if a supplier fails because another supplier is available without significant process changes. From the point of view of bargaining theory, maintaining a competitive situation within a product group can also pay off, at least at first glance. However, a second look through the lens of game theory provides a different perspective

on this approach and raises several questions. How much lower would prices have been with a single supplier? What savings could have been achieved from a maximally large package? What bargaining dynamics would have been created if a supplier had walked away empty-handed? What are the actual costs of losing a single supplier? Can other actions shift them? How many suppliers are in the market?

If you structure these (and many other) questions sensibly, they ultimately describe a tradeoff between risk minimization and cost. The difference is how that tradeoff is resolved. Traditionally, risk minimization is addressed and defined first (e.g., dual-source strategy), and then the cost is optimized within that defined framework. Game theorists, on the other hand, approach the problems concurrently. They design a strategy to make the tradeoffs where the most knowledge about price structures is available - which is always the market. Specifically, in this case, one could define a risk premium that a single-source solution must save to be better overall than the lower-risk but more expensive dual-source solution. Both solutions would then be negotiated in parallel. Market forces would decide which one wins by examining whether the market can save the risk premium through more attractive bundling and subsequent economies of scale.

It should be noted that a two-source strategy does not necessarily represent a (substantial) restriction of competition. If many suppliers are in the market, switching costs are low, volumes are still very high, and the anticompetitive effect is low. At the same time, this combination is relatively rare, especially for strategic product groups where risk considerations play a role. The fixed number of suppliers is a barrier to competition, which can be used to determine how intelligent game theory approaches succeed in producing solutions that are sometimes better, usually similarly good, but never worse than other approaches.

Further self-made competitive hurdles

Exclusion of suppliers: The priori exclusion of certain suppliers is the most apparent form of restriction of competition. Suppliers may need to meet supposedly stringent requirements. It is implicitly assumed that the unmet requirements would be unacceptable even for $0. When asked explicitly about the willingness to accept the unmet requirements at 100% savings or to make other arrangements, the answers are often different. Of course, no supplier offers products for $0. However, the thought experiment shows when a bonus-malus rule could replace the knock-out criterion. However, giving the challenger a theoretical chance is not the crucial point. The game theory analysis focuses on competitive dynamics. This means that even a challenger with little realistic chance of winning the contract can open up other options in the negotiation design or the award mechanism. Therefore, including a challenger should not be based solely on their potential to offer savings. Instead, the impact on the overall competitive dynamics should be considered.

Fixed amortization rules: Changing suppliers is costly and time-consuming. New suppliers must be connected to processes, and systems must be converted. Some purchasing organizations assess these costs on a flat-rate basis. In practice, a supplier change should only considered if the new supplier delivers a predetermined amount of savings to make the change worthwhile. Of course, switching costs need to be considered when making sourcing decisions. However, these should be determined individually as part of a delta assessment. Failure to do so is likely to distort competition. Competitors will likely support suppliers of smaller volumes because they would have to offer meager unit prices to break even. This effect can also occur for larger volumes if the payback is not spread over the product's life, but rather in the first two to three years.

Directed buy: Many tier 1 suppliers, especially in the automotive and aerospace industries,

receive supplier selection requirements from OEMs. Tier 1 suppliers are often not free to choose their supplier base, especially for safety-related parts or components important for branding to the end customer. This practice creates a de facto monopoly even when alternatives are available. This obstacle to competition is not directly homemade, and purchasing should work to minimize directed purchases.

Uncoordinated cross-functions: Regarding supplier relationships and their management, objectives often need to be more evident between the various functions. While engineering and manufacturing entities value reliability and continuity with known suppliers, purchasing must constantly review this relationship for acceptable costs. Purchasing's bargaining position is significantly weakened if engineering and manufacturing companies are on the side of existing suppliers (or, in the case of project awards, on the side of preferred suppliers). While preferences should play a role in decision-making, these preferences must be objectively measurable and, ideally, expressible in monetary terms. What happens if this is not the case and cross-functional functions do not speak the same language as purchasing when dealing with suppliers? The answer is nothing, at best, if the suppliers themselves correctly assess their competitive situation. The more likely scenario is that suppliers adjust their expectations, which is reflected in the trade-off between win probability and profit. In other words, suppliers favored by cross-functional entities feel more secure than would be conducive to competitive negotiation.

Last-Call Options: Last-call options (LCO) are very popular with experienced suppliers. An LCO gives a supplier the right to be awarded the contract in a negotiation under competitive conditions at the same price at which another bidder would have been awarded the contract without the LCO.

For a last-call option (LCO) to be attractive to a supplier, the buyer offering the LCO must be credible. It must also be assumed that only one supplier will receive an LCO. The supplier's strategic calculus changes when it has an LCO. Without additional incentives, a bidder with an LCO often has no reason to lower their bid price. It is frequently observed that bidders who are assured of an LCO only make price reductions after the final award decision. Substantial price reductions are possible only when they are faced with the award. The bidder with an LCO can abstain from further negotiations and wait to see what the final price will be.

An initial price negotiation with an LCO resembles a second-price auction in some ways. However, if the bidder accepts the conditional price with an LCO, the expected hammer price will be higher than the result of an English or Dutch auction. To compensate for this, the LCO would have to offer a price lower than the previously conditionally accepted price. The ideal gap is the anticipated gap between the lowest and second lowest reserve prices. This gap has yet to be determined but can be inferred from previously submitted prices.

An LCO results in a worse outcome without the additional discount from the previously conditionally accepted price. Therefore, the benefits of offering an LCO must outweigh the potential decrease in the expected value of the negotiation.

The fewer bidders involved, the greater the degradation in expected value resulting from an LCO. Therefore, an LCO should be used with extreme caution, especially when the number of bidders is small.

In game-theoretic auctions based on fixed rules and commitment, an LCO weakens commitment and reduces transparency. A take-it-or-leave-it offer can only be submitted with reservations. For the bidder, the actions of the contracting authority are no longer comprehensible in this case. As a result, acceptance of the process could suffer.

Thus, an LCO should only be awarded if the buyer receives a benefit in return that exceeds the costs. But how much of a benefit does it have to be?

Consider an auction with three bidders (L1, L2, L3) offering the following prices: P1= 100, P2= 105, P3= 92. Assuming a normal distribution with mean μ= (100+105+92)/3= 99 and standard deviation σ= 5.35, the distance between the lowest and second-lowest bid can be approximated as follows:

$$E(D1,D2) \approx \frac{\sigma}{n} \sqrt{\pi} = 3.162$$

Since the LCO is only effective if the minimum price of the bidder with the LCO is the lowest, this probability should be used to weigh the bid. For example, if the probability is 50%, the LCO advantage would have to be at least 3,162 * 0.5 / 99 = 1.6% of the total volume to be awarded. This does not consider the procedural disadvantages mentioned above, which would also have to be considered but are more difficult to calculate. Based on these assumptions, a direct benefit of at least 2% of the award volume would be necessary to offset the disadvantages of offering an LCO.

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topic ideas or new signups?

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The next newsletter will be published in Q3 2024.