

## “Negotiation Power!”

*How supplier value can be maximized by Mechanism Design Theory June '08*



To negotiate is in many situations of top priority. Most strategic business decisions are decisions between alternatives the details of which are still negotiable: investment decisions, acquisitions, cooperation negotiations, joint ventures, make-or-buy decisions or business awardings about significant volumina. In all these situations “negotiating skills” are a feature critical for success. The application of Mechanism Design Theory by Arthur D. Little is a means of systematic negotiation strategies and ensures sustainable success of a negotiation and its associated decision making.

### **Mechanism Design Theory in Procurement means to utilize the competition argument in its maximum severity and fairness.**

In most markets business relations have become subject to the intensity of competition and the pressure for prices to an ever larger degree. The car industry is a case in point. The overriding argument of competition (i. e. the negotiating argument of confronting one’s opponent with competition or the establishment of auctions) usually results in a better negotiating success, but may also lead to loss of confidence with the negotiating partner.

Only if its implementation is strictly tied to fairness and integrity the partner’s confidence will not be damaged. A negotiating process which has been designed with the scientific methods of Mechanism Design Theory will not only enhance the effect of the argument of competition, it will also convey fairness in the sense of comparability and integrity when it comes to keeping to the rules of negotiating and decision making that have been agreed on in advance.

### **Millions of dollars savings through a single well designed negotiation mechanism**

A typical Arthur D. Little success story involving Mechanism Design Theory in procurement reads as follows: A tier-one supplier in the automotive industry was looking for a development partner for the electronic control

#### *About Mechanism Design Theory:*

*Mechanism Design Theory and more general Game Theory are cutting-edge scientific disciplines of modern economics. This is documented not only by the Nobel Prize of economics 2005 for Aumann and Schelling or 2007 for Hurwitz, Maskin and Myerson, who have been dealing with Game Theory resp. Mechanism Design Theory.*

*Whenever you have to make a strategic decision whose result depends on the decision of third parties, you are in a situation that is to be viewed as “game” in a certain sense. Game Theory describes such situations abstractly and delivers methods to derive the optimum strategy, i.e. a strategy that will provide you with the best result. Thus, Game Theory should have been named more precisely “Strategy Theory”.*

*Mechanism Design Theory describes different “rules of the game” and analyses the effect of certain rules to certain players. For example in a negotiation situation in a buyer market, the buyer is in the role to define the rules of price negotiations. Therefore, he may use results of Mechanism Design Theory.*

unit (ASIC<sup>1</sup>) of its own module for the upcoming production series of a car manufacturer. The development department of the tier-one supplier had already pre-selected a tier-two supplier with whom it wanted to cooperate in the project. The head of the department had already negotiated about prices in person. This had resulted in a seemingly attractive offer which he recommended to the procurement department.

<sup>1</sup> ASIC = Application Specific Integrated Circuit

We suggested considering the additional efforts caused by intensive scrutiny of further offers as a strategic investment. It was possible to identify additional three tier-two suppliers who were in a position to work with the respective technology and who were accepted by the manufacturer. The contract was highly attractive for all four of the suppliers. Not only did the volume of 60 million Euros over a period of seven years promise a safe deal. The reputation of having been able to provide such an ASIC for the car industry was of equal value. Against this background a second round of negotiations with all four suppliers resulted in a price level that lay 12% below the initial offer.

As the final round of decision making we suggested carrying out a "Dutch Auction" (see gray box). This method belongs to the so called First Price Auctions and is recommended by Mechanism Design Theory in cases where at least one supplier is expected to buy an order at a strategic price. In that particular case the Dutch Auction resulted in a price which was 35% or about 20 million Euros below the initial level.

After the auction we interviewed the losing bidders about their calculations and bidding intentions. We discovered that as a consequence of a Second Price Auction such as a commonly known English Auction (see gray box) only a 15% reduction compared to the initial level would have been achieved. Savings of 20% or 12 million Euros were attributed to the proper decision for optimum Mechanism Design as recommended by Arthur D. Little.

### **Different mechanisms generate different results, depending on the specific competition situation**

An English Ticker Auction (see gray box) brings every bidder to its price limit, but ends when the second best bidder stops ("Second-Price result"). A Dutch Ticker Auction (see gray box) vice versa generates a "First Price result", but reduces the chances for the competitors to react on that price. The art of mechanism design is to combine these and other basic mechanisms to an individual, optimal negotiation process.

If more than one unit (lots) is negotiated at a time, there are major interdependencies between these units. Bidders may divide up the units and reduce competition via Strategic Demand Reduction. In order to manage these effects in the U.S. mobile phone broadcast licensings, bargaining theory (a sub discipline of mechanism design theory) was applied. It brought up new negotiation forms (e.g. Dynamic Combinatorial Negotiations, Clock Auctions etc.) that are applicable also in multiunit situations in procurement.

If negotiations are repeated in the same market from time to time, typically positive results reduce from

#### *Some basic negotiation mechanisms:*

##### **English Ticker Auction:**

*The buyer reduces the price in predefined steps until only one vendor remains that accepts that price.*

##### **Dutch Auction:**

*The buyer increases the price in predefined steps until a first vendor accepts.*

##### **Second Price Sealed Bid:**

*Every bidder places a one-shot-offer. The business is awarded to the bidder with best bid by the price of the second best bidder.*

##### **First Price Sealed Bid:**

*Every bidder places a one-shot-offer. The business is awarded to the bidder with best bid by the price he offered.*

##### **Chain of Take-it-or-leave-it:**

*A first supplier is asked to accept an aggressive price. If he accepts, the business is awarded to him. If he declines, a second bidder is asked to accept the price and so on.*

##### **Prisoner's Dilemma as negotiation element:**

*Two suppliers are asked to accept relatively tough terms and conditions and a moderate price. If only one of them accepts, the business is awarded to him. If both accept, they are invited to a further negotiation round about the price.*

event to event. Theoretically, the result of e.g. an auction is a true market price. Once identified, the chain of auction events approves that market price respectively shows, how the market moves. But in practice, there are major interdependencies between regularly performed negotiations. Again, bidders may divide up the market and reduce competition via Strategic Demand Reduction. E.g., Bidders learn to coordinate via signaling and improve their tactics from awarding to awarding. There is no way but to watch the market very carefully, to interpret the result of each negotiation and to adapt the mechanism design from event to event.

### **Arthur D. Little awarding projects with Mechanism Design generate major return and ensure sensible supplier decisions**

The essential prerequisites to successfully implement Mechanism Design Theory in the negotiating process are to ensure the comparability of negotiated alternatives. Therefore Arthur D. Little incorporates a bonus system. It calls for an evaluation of the bidder's various individual performances by the customer. If all bidders' performances must be considered as equally acceptable, none will receive a bonus. If a first bidder's performance (supplier A in figure 1) is to be considered as more acceptable than that of a second one (supplier B in figure 1), the first one will receive the bonus. The customer will determine the value of the bonus in such a way that he is indifferent as to whether he will accept the first bidder's offer at a

price exceeding the initial offer by the exact amount of the bonus or whether he will accept the second bidder's offer. Thus the bonus will adjust the argument of competition between the two bidders. Such a bonus system is also called a "Total-Value-of-Ownership"-bonus.

Applying the bonus system in negotiations calls for the term "comparative price". This is the price that will be negotiated with all suppliers. Let us assume supplier B (the one with the inferior performance) is to be selected as a "neutral basis". In this case his "comparative price" will be equal to his offering price. The first supplier's (A) comparative price, however, is the offering price minus his bonus. In comparison to his competitor the bonus will make him "stronger".

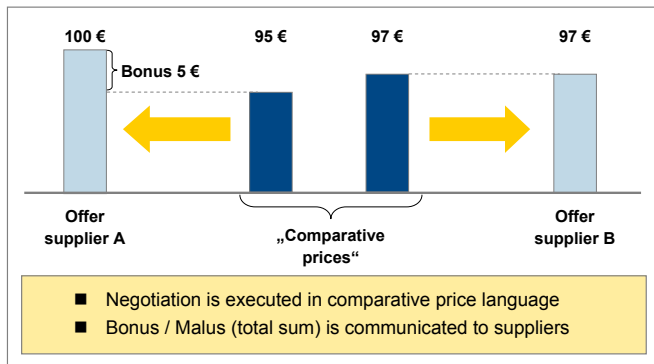


Fig. 1: „Comparative prices“ (based on a bonus system) lead to maximized competition argument – hard but fair in one

The one supplier with the best comparative price will win the awarding even though his final offer (his individual price) may be higher than his competitor's.

Judging from each comparative price mentioned in the negotiations, the supplier will be able to determine what it means to him. It is important for every supplier to know the accumulated amount of his boni. In addition, to even negotiate singular value components of his bonus with him in advance is a tremendous source of win-win situations between supplier and sourcing

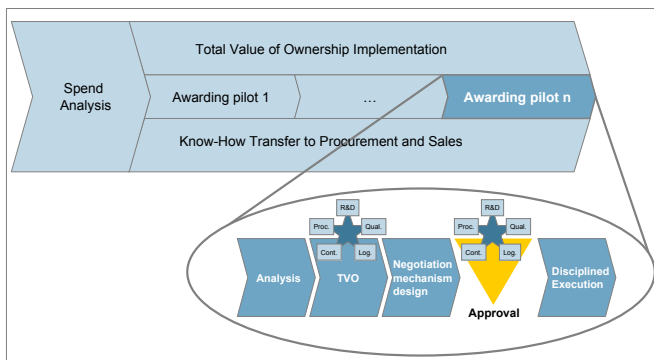


Fig. 2: Arthur D. Little roll out projects consist of spend analysis, TVO implementation, several pilots and know-how transfer to procurement and sales

company. So far it is irrelevant which negotiation mechanism will be applied. We have seen in many projects that only implementing a bonus system and talking about comparative prices have resulted in considerable competitive pressure.

Arthur D. Little roll out projects of the Mechanism Design method in procurement (see figure 2) start with a comprehensive spend analysis in order to identify short-term potentials. Based on the result, singular awarding pilots with mechanism design are executed. They are accompanied by a companywide implementation of a Total-Value-of-Ownership (TVO) approach, ensuring a consistent bonus evaluation in every single awarding. In parallel, know-how transfer to procurement staff is fulfilled via two days mechanism design negotiation seminars. Last but not least, the same competence is also of important use for sales representatives who are occasionally in the situation to be invited by their clients to negotiations that are designed by mechanism design methods.

Reference projects

Dual source versus single source strategy of an automotive supplier

An automotive supplier had to define the supplier(s) of an electronic component which was relevant for the car passenger's security. The five established suppliers offered relatively high prices respectively. Two challengers promised attractive prices but were not able to eliminate supply risks. We defined individual mali for each supplier reflecting his individual supply risk. A negotiation and decision mechanism was defined that delivered either an established supplier as single source or an established one together with a challenger as dual source. The result of the negotiation was an established supplier as single source with a price that was built under the impression of the challenger's prices – 25% below the original best offer of any established supplier.

Yearly price negotiations of a contract manufacturer

The yearly price negotiations of a contract manufacturer about a plastic part were historically affected by low competition among the nine incumbents. Some of them even had a monopoly position concerning singular material numbers. After a detailed analysis of "who delivers what" and "who can deliver what" and a consequent bundling of group wide demands of each material number we defined individual strategic packages of business for each supplier with a maximal spread between "gained business" and "lost business". Based on that, we developed a sequential negotiation mechanism with "take-it-or-leave-it" elements that delivered maximal competition. The result was a reduced supplier basis (three out of nine) and a price reduction of 17% on average.

Make-or-buy decision of an automotive supplier

An automotive supplier had to decide whether to source a mechanical module with electronic component or to source only the electronic component and to produce the module in house. The decision was of high strategic relevance because the possible suppliers of the module were competitors of the automotive supplier, delivering the module also directly to car manufacturers. We developed the total value of ownership values of both the module suppliers and the make alternative, using internal production costs of the module. Further more, we reflected the strategic aspect of the decision as significant bonus for the make alternative. Based on that bonus system, the module suppliers and the suppliers of the electronic component found each other in direct competition. The result of the negotiation mechanism was a decision for "make" and price reduction of the electronic component of 18%.

## Conclusion

The secret of success of negotiations lies within the individual choice of negotiating mechanism according to the competition or market situation respectively. The fundamental choice between e.g. sequential or simultaneous negotiations or between First Price Logic and Second Price Logic is determined by a large number of variants and functions to be taken into consideration. To put it simple: It is a question of putting the negotiation lever in the right spot. Making the correct or false choice may make the difference between losing or making a lot of money. It's proven by science that there is no better solution for that challenge than to apply Mechanism Design Theory.

The most important prerequisite when preparing negotiations and intending to employ Mechanism Design in a meaningful way is the comparability of the negotiated alternatives. Arthur D. Little ensures that through a bonus system that follows a Total-Value-of-Ownership approach. The establishment of Mechanism Design in procurement means essentially to implement Total-Value-of-Ownership as a companywide evaluation method of decision alternatives.

For more on Mechanism Design in price negotiations see "Spieltheoretische Verhandlungs- und Auktionsstrategien", Gregor Berz, Schäffer-Poeschel Verlag, Stuttgart, 2007

## Contacts

**Carsten Vollrath**  
Director –  
OM Practice  
Arthur D. Little Zurich  
vollrath.carsten@adlittle.com



**Dr. Gregor Berz**  
Senior Manager –  
OM Practice  
Arthur D. Little Munich  
berz.gregor@adlittle.com



**Dr. Daniel Deneffe**  
Director –  
S&O Practice  
Arthur D. Little Brussel  
deneffe.daniel@adlittle.com



## About Arthur D. Little

Arthur D. Little, founded in 1886, is a global leader in management consultancy; linking strategy, innovation and technology with deep industry knowledge. We offer our clients sustainable solutions to their most complex business problems. Arthur D. Little has a collaborative client engagement style, exceptional people and a firm-wide commitment to quality and integrity. The firm has over 30 offices worldwide. With its partners Altran Technologies and Cambridge Consultants Ltd, Arthur D. Little has access to a network of over 16,000 professionals. Arthur D. Little is proud to serve many of the Fortune 100 companies globally, in addition to many other leading firms and public sector organisations. For further information please visit **www.adl.com**

Copyright © Arthur D. Little 2008. All rights reserved.