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- Why game theory in procurement will continue to be considered innovative for a long time -

In 2018, brandeins / McK Wissen magazine published an interview with the globally renowned game theorist and recipient of the Leibniz Prize, Professor Axel Ockenfels, about the role of procurement auctions in industrial goods marketing.[1] Prof. Ockenfels, who based on experimental game theory has contributed very interesting insights on C2C auctions (e.g. eBay), in this interview offers some reflections on the applicability of auctions in industry which are reminiscent of the early days of the 'game theory in procurement' methodology 20 years ago. Having been alerted to the interview in the course of our expert forum 'Game Theory in Procurement' with high-ranking industry representatives, we feel that a few comments are in order.

Prof. Ockenfels' introductory statement that "it is less widely known that these days, online auctions also play an important role in the corporate sphere" can only be understood as being directed at the broad audience of brandeins magazine. His chosen example – "an automotive supplier … requires a million bolts" – reminds us of the old slogan, "Only commodities are auctionable – and the earth is flat." Further below, Prof. Ockenfels informs us that "standardised goods, such as bolts, tyres or paper, are most suitable – the more explanation a product requires, the more complicated the auction becomes", and he continues, "the aspired deal should be based on simple contracts". Together with the statement that "online procurement auctions save the buyer time and money because he does not have to negotiate with each supplier individually", this reveals the state of knowledge in industrial goods marketing of the 1990s.

Vice versa, we have long known that additional effort of preparing an auction in a complex market and product environment is by far overcompensated by improved auction result achieved in the market – which in the course of these preparation is often only created in the first place or skilfully manipulated towards increased competition. By contrast, auction results for a commodity such as bolts will rarely draw professional industrial buyers from the woodwork because the market prices for commodities are typically transparent and easily accessible. To speak of "huge savings potential" in the context of commodities, and to even explicitly state that "auctions can often help companies reduce their procurement costs by 20 to 40 percent" seems very bold from our perspective and experience in many industrial goods markets – to put it politely. And this is not to mention in any detail that, because of historically collusive market participants, specifically paper and probably likewise tyres are often not at all suited for auctions, or at least not at all suited as a didactic example for them.

The ensuing description of the "scoring auction" then takes us back 20 years and in particular denies us the extremely valuable practical insights that have been gained in the context of public procurement law. In public tenders, the "best value offer" is indeed typically identified using a

[1] www.brandeins.de/corporate-publishing/mck-wissen/mck-wissen-pricing/wer-bietet-weniger

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score matrix, in which the price is also assigned a score and the overall score ultimately determines the decision. However, this two-step process, in which the price is considered first and the other criteria later, is highly debatable – in practice, the evaluation matrix comprising all the other criteria is usually established first and the price comes into play last. That being said, the relative weights of the criteria considered in the score matrices often cause systematic distortion because in practice it is impossible to fine-tune the effects of these weights on the value-for-money ratio in such a way as to reflect the actual preferences of the decision-makers. Therefore, the practice of "game theory in procurement" uses monetarised bonus systems: Each criterion is evaluated in the form of a price discount or surcharge and thus adjusted with respect to its effect on price. We automatically obtain a natural set of weights for the criteria. While this discussion may seem moot to some, it is highly relevant in practice, and we have learned from our clients that are subject to public procurement law and from their legal departments that a monetarised bonus system is indeed compatible with the principle of selecting the offer that provides the best value for money. In the world of public procurement, this is nothing short of a revolution, which must be mentioned in this context.

The whole issue of the "decision commitment of an auction", which we know from practice to be critical and highly relevant to the outcome of an auction, is briefly touched upon in the interview. Yet Prof. Ockenfels' statement that "the rules according to which the winner will be selected should principally be disclosed transparently and unambiguously prior to the auction" falls much too short. His impression that without decision commitment, the bidders "will be inherently ignorant of the criteria based on which the buyer ultimately makes a decision. Therefore, the buyers will try to offer as attractive a package as possible" is directly at odds with the observations that we make time and again when applying game theory to procurement: Without decision commitment, not to mention the case when the decision criteria are not disclosed, suppliers will often even add a "risk margin" to their bids, rather than, as Prof. Ockenfels assumes, making their bids more attractive. It would appear worthwhile to validate this assumption against actual business practice and, if appropriate, also in a laboratory setting.

The subsequent discussion of the winner's curse is correct. These insights have featured in all game theory textbooks for well over 20 years. To this day, however, it is often overlooked, as in the interview, that the only auction type that truly reduces the risk of winner's curse is a special type of the English ticker auction (or clock auction) in which the number of remaining bidders is counted down. For in no other type of auction that is relevant to industrial practice does a bidder receive the information – which Prof. Ockenfels indeed mentions in this context – as to how many other bidders have already dropped out. This is not the case in particular with any of the dynamic types of English actions that are well familiar from the established online auction platforms. This ought to be mentioned when discussing the winner's curse in the context of industrial auctioning practice.

The discussion of code bidding deserves similar criticism. The example that Prof. Ockenfels sketches did indeed take place in a US mobile phone spectrum auction in the 1990s and has since featured in all game theory textbooks. However, here too, the English ticker auction (also known as Japanese auction) is the only type of auction, at least among the English auctions, which prevents signalling, as it is also called. It is not fully prevented by any type of dynamic English auction, even if the auction only shares some rank information or traffic light colour

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codes among the bidders, rather than the actual prices. So long as a bidder drives the dynamics of the auction with his active bid, by doing so he also sends to his competitors a signal that goes beyond the mere “I’m still in”. If Prof. Ockenfels and his Cologne Laboratory for Economic Research dedicate themselves to the field of B2B auctions for industrial goods, we would like to propose this insight for investigation.

Finally, the interview also addresses the interplay of cooperation and competition. Sadly, several levels are confused here. For example, in the context of B2B price negotiations, we must differentiate between (horizontal) cooperation among competitors – also known as collusive behaviour – and (vertical) cooperation between supplier and customer. Which pie is to be made “as the first step”: that which a customer shares with the supplier, or that which the customer distributes among the suppliers? In any case, the pie is exclusively defined in between the indifference prices in the vertical perspective. To call horizontal collusion ‘cooperation’ may be expedient; however, it does not really lead to a larger pie, but only to a larger piece of the pie for successfully collusive suppliers. Anyway, in practice it will not be possible to first of all jointly enlarge a mutual pie of all parties – i.e. of the customer and all suppliers, some of which are yet to be excluded – in simultaneously vertical and horizontal cooperation, before competition is introduced only in a second step: One of the most important lessons we have learned in 20 years of experience in applying game theory to industrial goods marketing is that in the vertical relationship between the customer and each individual supplier, you can only either play the competition card or rely on cooperation, which should then aim for the parties to meet half-way (as incidentally Prof. Ockenfels also finally mentions). To try and combine both strategies only serves to damage long-term relationships and trust.

To consider the world of vertical cooperation – i.e. long-term strategic partnerships – from a game-theoretic perspective and in doing so to apply cooperative game theory, i.e. purposely beyond auction theory – this is where we currently see the methodological development of game theory in procurement headed. If Prof. Ockenfels is able to make an experimental contribution to this field, we may all look forward to the results.

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