THE POWER OF GAME THEORY IS IN YOUR HANDS

SURVEY ON THE APPLICATION OF GAME THEORY IN PROCUREMENT

RESULTS
To coincide with the launch of their knowledge partnership, CIPS and TWS Partners conducted a survey on the application of game theory in Procurement. The survey shows that although the basic concept of game theory is well known amongst Procurement professionals and is acknowledged as a powerful methodology, the actual application in a buyer’s day-to-day business is still relatively limited. This can partly be attributed to a lack of in-depth knowledge and experience, as well as absence of structured, company-wide initiatives to adopt the methodology.

However, more and more organisations recognise the potential of game theory within their operations. Most of the organisations who don’t apply game theory today expect to use game theory for negotiations and sourcing decisions in the future.

- **Game theory is widely known**
  80% of the participants have come across game theory before

- **Game theory creates added value**
  90% of all users are convinced that game theory can contribute to their success

- **Game theory is becoming more and more popular**
  although only 9% of the participants use game theory today, every other respondent thinks this will change in the future

- **Game theory is broadly applicable**
  80% of the respondents confirm that the methodology can be used even for medium and highly complex commodities

- **Larger sourcing volume, higher degree of application**
  6% of the respondents who work in companies with a sourcing volume USD <1bn apply game theory vs 24% in companies with a sourcing volume USD >1bn
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WHAT IS GAME THEORY?

Game theory is the scientific modelling of interactions between different parties each pursuing their own interests. The parties interact and choose their actions in view of what the other parties might think and do. Research on game theory is a very active branch of economics, which has won several Nobel Prizes.

Economists call these interactions ‘games’ and the decision makers ‘players’. In business, the application is twofold: Firstly, game theory is a method for understanding the ‘rules’ of an interaction and for finding the best strategy in that setting, e.g. in negotiations. Thus, game theory finds the best strategy for you, given a specific setting. Secondly, game theory is a method for structuring interactions so that the participating parties are steered towards a desirable outcome. This means game theory helps to design and shape a playing field, where everyone is working towards the best outcome for yourselves.

In Procurement, the design aspect of game theory is particularly effective, as the buyer typically sets the rules for the negotiation process and the clauses that govern the contractual relationships after supplier nomination.
WHY THIS SURVEY?

Upon launch of their knowledge partnership, CIPS and TWS Partners conducted a survey on the application of game theory in Procurement. The survey investigated the current level of awareness for the topic and degree of application with more than 150 Procurement professionals from across the globe participating in the survey.

The results demonstrate a genuine and pronounced interest among Procurement professionals in game theory and the value it can add, although there are still uncertainties about what game theory is really ‘all about’ and how it can be effectively used to improve the performance of Procurement. Only a very limited number of organisations use the methodology comprehensively today.

The feedback from survey participants reassured CIPS and TWS Partners how important it is to be at the forefront of this development, to provide continuous thought leadership to CIPS’ members across the globe. The results will help CIPS and TWS Partners to further create content tailored to the needs of professionals working in Procurement; offering CIPS’ members a leading resource for game theory knowledge.

“We recognise the importance of game theory for Procurement professionals and the organisations they work for to respond to the future challenges that the profession will face, as well as the part it will play in building Procurement’s reputation as a value driver within those organisations. The feedback from our members after last year’s CIPS UK Annual Conference and the interest shown in game theory, demonstrated how important it is for CIPS to be at the forefront of this development, providing continuous thought leadership to our members.”

Helen Alder, Head of Knowledge and Product Development at CIPS, about Game Theory
THE SURVEY

WHO PARTICIPATED IN THE SURVEY?

From the 153 Procurement professionals taking part in the survey, 42% work in companies with less than 1,000 employees, 34% in companies with 1,000 to 10,000 employees, and the remaining 24% in companies with more than 10,000 employees (figure 1), with company size ranging from less than 100 to more than 200,000 employees. In terms of sourcing volume, respondents’ companies span volumes from less than USD 100m to over USD 50bn.

The survey has been completed by a highly diverse sample of Procurement professionals, spanning all roles from buyers to CPOs, with numerous different backgrounds ranging from Construction to Retail. The largest group works in Manufacturing and Engineering, followed closely by Governmental and Public Services (figure 2).
The results from the survey confirm that game theory is widely known and recognised as a ground-breaking field of research. 80% of the participants report to know game theory and have at least a basic understanding of it (figure 3). Yet, the fraction of participants who report to be currently applying game theory in their day job is rather small, amounting to only 9% of respondents. Even in the group of people who already use game theory today, the knowledge of some seminal game-theoretical concepts such as the Nash Equilibrium or Backwards Induction is rather limited. Only 41% and 30% of the participants who report to be familiar with game theory, state to have at least basic knowledge of these concepts, respectively (figures 4, 5).

**How prominent is game theory?**

Most participants have come across game theory before, but only very few apply it to its full capacity today.
When applying game theory in Procurement, it is also necessary to be familiar with auction theory – a branch of game theory which deals with Procurement settings, looking at multilateral negotiations between a single buyer and multiple bidders. The actual negotiation can take any format – not only the widely known mechanistic auction formats used at auction houses like Sotheby’s. The term ‘auction theory’ is therefore slightly misleading as the insights gained by auction theory can also be fruitfully applied to non-auction negotiations and other business interactions. In the survey, 66% of the participants who report to know game theory also know auction theory. However, only 9% affirm to have a profound knowledge of the field.

Independent of whether the surveyed professionals are already applying game theory, an overwhelming majority (90% of users and 80% of non-users) are convinced that the use of game-theoretical methods creates added value for the Procurement department (figures 6, 7).

The use of game-theoretical methods creates added value for the Procurement department.

**Figure 6**

**Users:** The use of game-theoretical methods creates added value for the Procurement department.

- 80% strongly agree
- 10% neutral
- 10% strongly disagree

**Figure 7**

**Non-users:** The use of game-theoretical methods creates added value for the Procurement department.

- 57% strongly agree
- 19% neutral
- 23% strongly disagree
- 1% agree
Whilst extensive experience in Procurement can certainly have a very positive impact on negotiation results, an in-depth theoretical knowledge is necessary. For example, while rule-based negotiations (described in a recent TWS-whitepaper) can lead to great results, choosing the wrong negotiation rules can have disastrous effects. Theoretical expertise as well as operative experience is necessary to determine the relevant characteristics and thus the format of the negotiation rules.

The perceived importance of in-depth expertise as well as the low level of application in Procurement reported above potentially indicate the need for further guidance enabling organisations to leverage the methodology, especially recognising that every second participant thinks that their organisation may apply game theory in the future, and more than 80% of all participants see game theory as value-adding methodology.

Every second participant thinks that their organisation may apply game theory in the future.
Organisations with a larger sourcing volume have a higher tendency to apply game theory.

Analysing the fraction of participants who do apply game theory reveals some interesting insights. Whilst only 6% of respondents who work in companies with a sourcing volume of less than USD 1bn report that game theory is applied in their organisation, this number rises to 24% if the sourcing volume is higher than USD 1bn. This indicates that organisations with a higher sourcing volume, and arguably a higher level of professionalism have a higher tendency to apply game theory - a finding that could also be driven by the efforts and resources required to upskill the Procurement teams. This potentially also explains why only half of the respondents who apply game theory state that their organisation has not centralised the competencies in an internal centre of excellence.

A vast majority of the respondents (80%) confirm that the methodology can be broadly applied. They confirm that the application reaches far beyond highly commoditised goods and services, and is also capable of addressing categories with medium and high complexity. This finding can be explained by the nature of the methodology, which is centred in Procurement settings around the interaction between buyers and suppliers and not any specific commodity or market situation.

Game theory can even be used in highly complex settings.

However, the application seems to be mostly limited to sourcing-related activities. User responses show that from the numerous opportunities for application, only a small set is actually used: Whilst all users apply game theory for conducting supplier negotiations and optimising tenders at least sometimes, only 60% do the same for developing incentive schemes.

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Game theory provides added value to all relevant corporate strategy decisions and can be applied not only in Procurement, but in almost all business areas. These can include complex market entry decisions, the purchase or sale of assets and business units, the marketing of IP rights or the optimisation of top line sales.

In our survey, we asked the non-users for their opinion on the potential (future) areas of application of game theory and its branches. A vast majority believes that game theory can not only optimise tender and sourcing decisions (94%), but also companies’ overarching sourcing processes (91%). Although many respondents of our survey do not apply game theory for incentive contracting (see above), non-users think that game theory can be useful to develop incentive schemes (90%). Moreover, they identify further areas besides Procurement, e.g. internal processes, sales-related activities, underwritings and corporate strategy, where game theory can add value.
The survey confirms the observation that although the basic concept of game theory is well known amongst Procurement professionals and acknowledged as a powerful methodology, the actual application is still limited today. This seems to be due to a lack of profound knowledge and experience, as well as absence of structured, company-wide initiatives to bring the expertise in-house. However, game theory is still a rather new field in academic research, and so is its application in business. The results of our survey indicate that more and more Procurement professionals and their organisations recognise the potential of game theory for Procurement and other business areas. Independent of whether they are already applying game theory, the vast majority of the surveyed Procurement professionals (90% of users and 80% of non-users) are convinced that the use of game-theoretical methods creates added value for the Procurement department. Therefore, the number of organisations applying game theory, as well as the knowledge and experience of the field, is certainly set to grow.
If you would like to learn more about game theory and how it can be a "game changer" for Procurement, you can find articles, whitepapers, videos and case studies on our CIPS Knowledge page dedicated to game theory: https://cips.org/en/knowledge/procurement-topics-and-skills/game-theory/game-theory/