



# How IFAMD Matrix links Procurement Strategy to Game Theory Measures in Industrial Procurement<sup>1</sup>

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**Abstract:** We introduce a new approach to connect procurement strategies with supplier negotiations, which is the key activity of “Strategic Procurement”. We segment the supply markets into four different groups based on two dimensions which are own market position and the market attractiveness (“buyer’s market” vs. “seller’s market”). These fields form the new supply market segregation matrix which we call IFAMD Matrix. Each field implies different negotiation power for the negotiation participants. Then we propose the different norm strategies per field in order to achieve best negotiation results for the buyer.

For that purpose, we introduce an established methodology consisting of 10 steps to apply game theory into the negotiation preparation. As a link between procurement strategy and negotiation preparation, we introduce 12 generic strategic tasks to be performed by strategic procurement. Finally, we identify specific norm strategies for the different IFAMD Matrix fields and relate them – through the 12

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strategic tasks – to the specific game theoretical relevant negotiation preparation steps.

## **1. Introduction**

During the last decades, it is a general consensus that game theory has become a primary methodology used in supply chain management and industrial procurement related problems (Leng and Parlar 2015, Vasnani et al. 2019).

Game theory is used in the different fields of Supply Chain Management, but one of the most important applications of game theory is in procurement. More specifically, it is widely used in conducting supplier relationship management and contract negotiation (Berz 2015, Holler and Klose-Ullmann 2020, and Pfeiffer 2021).

At the same time, suppliers' power and influence have increased dramatically – as a natural consequence of the ongoing trend of decreasing depth of added value at every step of the value chain – making supplier management one of the key elements in procurement strategy and supply chain management. Without a systematic approach, working with a large number of suppliers, each with their own competitive advantage, is difficult (Fallah Lajimi and Majidi 2021). Even if the number of active suppliers is relatively small, each firm often faces the big number of potential suppliers. As a result, supplier segmentation has become a key element in procurement strategy and supply chain management.

To the best of our knowledge, there is a missing link between these two branches of the procurement literature – game theoretical literature does not deal with supplier segmentation and segmentation literature does not provide a tool specialized for the game theoretical framework.

The main theoretical approach in supplier segmentation as well as the most used practical tool is portfolio approach supplier segmentation proposed by Kraljič (1983) 40 years ago. It segments the supplies in terms of two dimensions – supply risk and profit impact. However, portfolio approach focuses on 'supply' and not the 'supplier' or 'supply market' and cannot be used as a tool to solve the strategic relationship between the buyer and its suppliers (Rezaei and Fallah Lajimi 2019).

There is a number of the recent papers, which propose alternative supplier segmentation approaches. Rezaei and Ort (2012, 2013) and Rezaei and Fallah Lajimi (2019) introduce supplier willingness and capability as

relevant dimensions. Where willingness and capability represent an index based on multiple criteria.

These papers are an example to a general trend to include an increasing number of criteria in the supplier segmentation decision. Shiralkar et al. (2022) present a recent literature review and deduce that supplier segmentation is a multicriteria problem. They claim that the inclusion of more and more criteria makes the supplier segmentation decision-making process more inclusive and effective. The study highlights the importance of Process, Economic and Technological factors in supplier segmentation decision-making.

Another example of this trend is given in Paybarjay et al. (2023). This research has employed the sustainability approach that includes economic, environmental, and social dimensions to evaluate and then segment the suppliers.

All these do not provide satisfactory approach with regard to the game theory applications. We claim that the main goal of strategic procurement is to close the best contracts with the best suppliers, which means to prepare and perform successful negotiations. But in the segmentation literature there is a lack of direct reference to the critical success factors of strategic procurement, as they regularly show up in game-theoretical optimization of negotiations.

In the current paper we try to bridge and introduce a new approach to procurement strategies and supplier segmentation. We segment the supply markets into four different groups based on two dimensions which are own market position (essentially own demand volume in relation to the total market volume) and the market attractiveness (essentially the general supply-demand-volume-ratio in the market). These fields form the new supply market segregation matrix which we call IFAMD Matrix. Each field implies different negotiation power for the participants. We claim that these straight and relatively easily measured dimensions, which are not based on some complicated index, are most relevant for strategic procurement. The changes in supplier characteristics, discussed in the above-mentioned papers, would ultimately lead to a change in the market position and negotiation power, so they are implicitly included in our consideration

Finally, we connect this new segmentation with the established IFAMD methodology consisting of 10 steps to apply game theory into industrial procurement negotiation preparation (Berz 2022). Therefore, we introduce 12 generic strategic tasks to be performed by strategic procurement. These 12 tasks are inspired by the idea of Balanced Scorecards for corporate

strategies (Kaplan and Norton 1996) whereby, for procurement strategies, we replace the four classic perspectives of a Balanced Scorecard with the two essential perspectives of industrial procurement: the internal perspective ‘Demand’ and the external perspective ‘Supply’. Then, we identify specific norm strategies for the different IFAMD Matrix fields and relate them – through the 12 strategic tasks – to the specific game theoretical relevant negotiation preparation steps. As a final result, for each field in the IFAMD matrix, we propose the different norm strategies in order to achieve the best negotiation results for the buyer.

There exists a substantial literature dedicated to the practical implementation of the Kraljič methodologies. He introduces the qualitative model “which results in a subjective method for weighting and positioning suppliers or commodities in the various quadrants” (Montgomery et al. 2018). Different methods were proposed and tested in a case study to overcome this problem and create an objective method which allows the practical model implementation. Montgomery et al. (2018) use quantitative decision analysis and demonstrate this approach using data from an organization with a 10 billion purchasing portfolio. Medeiros and Ferreira (2018) use the Fuzzy-TOPSIS method and decision rules to managing a purchasing portfolio for a large Brazilian hospital. Ferreira et al. (2015) use Analytical Hierarchical Process (AHP) technique for criteria prioritization in both dimensions and direct measurement employed for rating construction item classes. A multidimensional scaling approach was employed to place the items in the purchasing portfolio matrix. They apply these methods in a single empirical study in a large Portuguese multinational construction company. The proposed IFAMD matrix has no such problems: we introduce two dimensions which rely on direct, quantitative and relatively simple measurements, ready to be implemented in practice. Yet, we insist that these measurements capture the essential criteria for segmentation aimed to efficient negotiation preparation.

Moreover, the qualitative nature of Kraljič model is not the only limitation of its implementation in practice. There is an empirical doubt that its recommendations hold true. Hesping and Schiele (2016) use the data from a survey in order to classify 107 sourcing projects of direct products into the non-critical, leverage, bottleneck and strategic quadrants of the Kraljič matrix and to compare and contrast the profile of applied tactical sourcing levers in each quadrant. They show that “in practice, the full range of tactical sourcing levers is used in each of the four quadrants of the Kraljič matrix. Based on the study’s findings, we advocate moving away from a

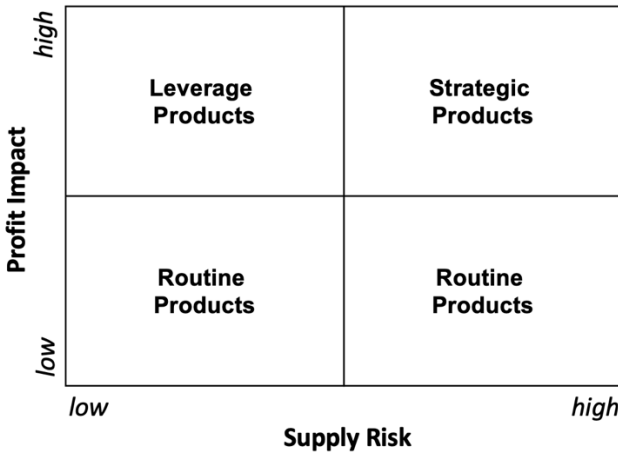
strict adherence to a limited number of recommended tactics in each quadrant of the Kraljič matrix. Purchasers in practice use a mix of all tactical sourcing levers in all portfolio quadrants.” In the IFAMD method we do not face such a problem. Despite being by itself a relative new concept, the matrix is deeply embedded in the already existing IFAMD 10 steps negotiation design methodology which was numerously implemented in practice and proved its success. The specific norm strategies proposed for each quadrant matrix are implemented under 12 tactical tasks, which are indeed, as Hesping and Schiele (2016) shows us, always used in negotiation preparation.

The paper is organized as follows. In the next section of this paper, we summarize the literature on supplier segmentation and buyer strategies. We will stress why, in our opinion, we need a new way to segment not the suppliers but the supply markets. In section 3 we concentrate on the original Kraljič (1983) paper, which is mostly ignored in the literature and only one small part of it is usually cited. The “forgotten” part of Kraljič (1983) serves as an inspiration to our segmentation proposal, but we will highlight the differences between Kraljič and our approach. In section 4, we shortly introduce BCG matrix, which inspired the idea of two dimensions based on the market situation and the buyer’s own attractiveness. Then we adopt the reverse approach for the supplier market and introduce IFAMD segregation matrix. We segment the supply markets into different groups so that we can apply the different norm strategies in order to achieve the best negotiation results. We describe in more details the two dimensions and four resulting Matrix fields which imply different negotiation power. In section 6 we introduce the methodology consisting of 10 steps to apply game theory into negotiation preparation. Then we introduce 12 generic strategic tasks to be performed by strategic procurement. Finally, we identify specific norm strategies for the different IFAMD Matrix fields and relate them to the specific game theoretical relevant negotiation preparation steps through the 12 strategic tasks. Section 7 concludes.

## **2. A Review of the Supplier Segmentation Literature**

The most influential work on the supplier segmentation is still Kraljič (1983). In scientific and popular literature, it is usually summarized as a two-dimensional approach which is based on product characteristics. According to this approach, the products are divided basing on two dimensions of risk and profit, and potential suppliers are classified along

the same dimensions (see Figure 1). The matrix is known as Kraljič Matrix or Purchasing Portfolio Matrix (PPM). We will discuss the original Kraljič paper in more details in the next section; the discussion will be more detailed as it is usually presented.



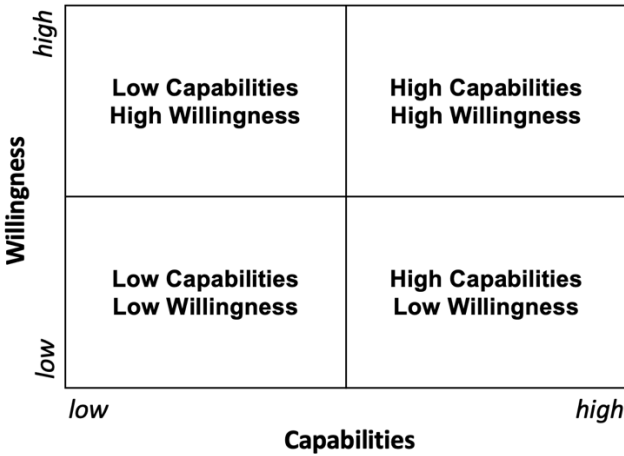
**Figure 1:** Purchasing Portfolio Matrix known as “Kraljič Matrix”

Since 1983, the supplier segmentation literature has always been dominated by the portfolio approach of Kraljič. In Lajimi and Majidi (2021) 26 out of 52 reviewed papers propose some variation of a portfolio approach: the proposed models are focusing on supplying goods with respect to product characteristics, among them Olsen and Ellram (1997), Gelderman and Van Weele (2003) and more recent Medeiros and L. Ferreira (2018) and Rius Sorolla, Estelles-Miguel, and Rueda-Armengot (2020). The main critique which is relevant for our paper is that Kraljič (1983) has a focus on ‘supply’ and not ‘supplier’: the dimensions characterize the product and cannot be used as a tool to solve the strategic relationship between the buyer and its suppliers (Fallah Lajimi and Majidi 2021)<sup>2</sup>.

As an alternative to this critique, the literature proposes the alternative approach, the so-called involvement segmentation. The involvement approach was first proposed by Dyer et al. (1998) and has a focus on the relationship between the buyer and suppliers. Rezaei and Ortt (2012)

<sup>2</sup> There exist different critiques on Kraljič (1983), for example that there are not enough dimensions in the matrix to be of practical use etc. but we will only focus on the critique related to strategic relationship.

presented a model for supplier segmentation called the Supplier Potential Matrix (SPM), which is based on two dimensions of Capabilities and Willingness (see Figure 2). They define supplier segmentation as “the identification of the capabilities and willingness of suppliers by a particular buyer in order for the buyer to engage in a strategic and effective partnership with the suppliers with regard to a set of evolving business functions and activities in the supply chain management”.



**Figure 2:** Rezaei and Ortt (2012), Supplier Potential Matrix.

The two approaches, PPM and SPM, complement each other. Rezaei and Fallah Lajimi (2019) propose to apply these two approaches to companies in order to make better decisions since the combined model covers more aspects of the supplier and buyer relationship. This paper is a part of the latest developments in the supplier segmentation approach called ‘portfolio and involvement’.

Rezaei and Fallah Lajimi (2019) identify four common elements in Supplier Relationship Management: actors, elements of exchange (e.g., material, information), coordination, objectives (e.g., minimizing costs). They claim that the supplier segmentation should consider all these elements and that combined ‘portfolio and involvement’ approach looks at all of them and not only at the characteristics of supply, it also considers the characteristics of the suppliers. In Fallah Lajimi and Majidi (2021) 21 out of 52 reviewed papers propose some variation of combined portfolio and

involvement, for example, Rezaei and Ortt (2013), Rezaei, Kadziński et al. (2017), Parkouhi et al. (2019), and Santos et al. (2017).

As we could see, there are several attempts to introduce new ways of supplier segmentation, but, to the best of our knowledge, none of them is based solely on the market structure analysis as the main dimension component, which we see as a key issue for the successful implementation of bargaining with suppliers. As we see in Rezaei et al. (2019: Table 3), none of the multiple criteria addresses the market structure. Partly, the reason is that the majority of papers are concentrating on the relationship of a buyer with already contracted suppliers. In addition, some criteria are either subjective, difficult to quantify and not orthogonal. Moreover, dealing with a number of criteria implies that we need to introduce some kind of weighting strategy, which complicates the practical implementation. Given that, it is not a surprise that recent literature usually does not provide clear strategy implications based on the game theoretical analysis. So, it is not a big surprise that there is still no theoretical segmentation proposal which can successfully replace Kraljič in practice.

### **3. The Forgotten Kraljič Matrix**

As you can see in the previous chapter, the most influential work on the supplier segmentation is Kraljič (1983) usually presented as Kraljič Matrix or the Purchasing Portfolio Matrix (PPM) (see Figure 1).

But if we read the original Kraljič paper, we can see that the classification of suppliers based on this matrix, is only the first step in shaping the supply strategy: “At first, the company classifies all its purchased materials or components in terms of profit impact and supply risk. Next it analyzes the supply market for these materials. Then it determines its overall strategic supply position. Finally, it develops materials strategies and action plans” (Kraljič 1983).

This initial classification is even not called PPM; Kraljič gives this name to a quite different matrix, which is the result of step 4 on the supply strategy design. The first figure in Kraljič (1983) presents the commonly known division in four categories based on supply risk and profit. The result of this two-dimensional classification, is called “Classifying Purchasing Materials Requirements,” see Kraljič (1983: Exhibit II) and not PPM as it is usually cited in the Literature.



Kraljič continues with the market analysis, the company weights the bargaining power of its suppliers against its own strength as a customer, based on 10 criteria (see Figure 3).

<b>Exhibit III</b>		<b>Purchasing Portfolio Evaluation Criteria</b>	
		<b>Supplier strength</b>	<b>Company strength</b>
1	<b>Market size versus supplier capacity</b>		<b>Purchasing volume versus capacity of main units</b>
2	<b>Market growth versus capacity growth</b>		<b>Demand growth versus capacity growth</b>
3	<b>Capacity utilization or bottleneck risk</b>		<b>Capacity utilization of main units</b>
4	<b>Competitive structure</b>		<b>Market share vis-à-vis main competition</b>
5	<b>ROI and/or ROC</b>		<b>Profitability of main end products</b>
6	<b>Cost and price structure</b>		<b>Cost and price structure</b>
7	<b>Breakeven stability</b>		<b>Cost of nondelivery</b>
8	<b>Uniqueness of product and technological stability</b>		<b>Own production capability or integration depth</b>
9	<b>Entry barrier (capital and know-how requirements)</b>		<b>Entry cost for new sources versus cost for own production</b>
10	<b>Logistics situation</b>		<b>Logistic</b>

Figure 3: Kraljič (1983: Exhibit III).

In the next step Kraljič introduces the actual PPM matrix, which is 3 × 3, based on the market analysis criteria. The company positions the materials, identified in the first classification step as strategic, in the purchasing portfolio matrix (see Figure 4).

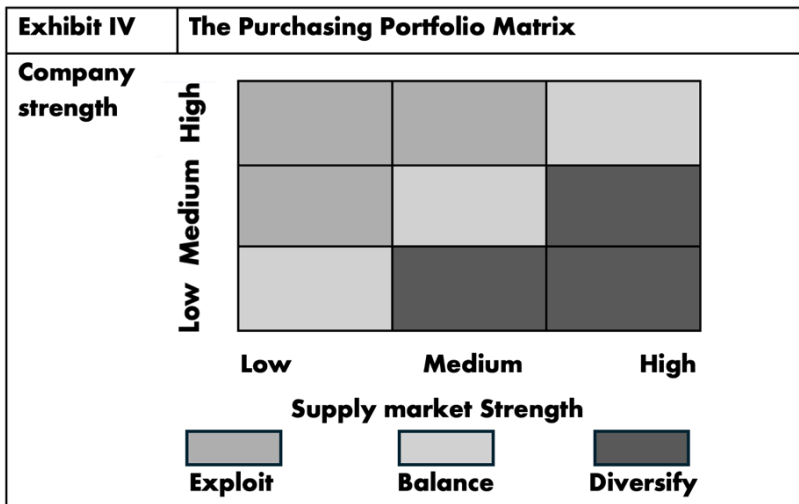


Figure 4: Kraljič (1983: Exhibit IV)

The PPM plots company buying strength against the strengths of the supply market, each divided into low, middle and high intervals. Then three categories are defined: exploit, balance and diversified, each associated with different strategies vis-à-vis key suppliers – an approach sometimes called “reverse marketing”.

In the last step, the distinctive implications for each of three strategic categories are presented for key elements of the purchasing strategy, such as volume, price, supplier selection, material substitution, inventory policy, and so on (see Figure 5).

	 <b>Exploit</b>	 <b>Balance</b>	 <b>Diversify</b>
<b>Policy issues</b>			
<b>Volume</b>	<b>Spread</b>	<b>Keep or shift carefully</b>	<b>Centralize</b>
<b>Price</b>	<b>Press for reductions</b>	<b>Negotiate opportunistically</b>	<b>Keep low profile</b>
<b>Contractual coverage</b>	<b>Buy spot</b>	<b>Balance contracts and spot</b>	<b>Ensure supply through contracts</b>
<b>New suppliers</b>	<b>Stay in touch</b>	<b>Selected vendors</b>	<b>Search vigorously</b>
<b>Inventories</b>	<b>Keep low</b>	<b>Use stocks as “buffer”</b>	<b>Bolster stocks</b>
<b>Own production</b>	<b>Reduce or don’t enter</b>	<b>Decide selectively</b>	<b>Build up or enter</b>
<b>Substitution</b>	<b>Stay in touch</b>	<b>Pursue good opportunities</b>	<b>Search actively</b>
<b>Value engineering</b>	<b>Enforce supplier</b>	<b>Perform selectively</b>	<b>Start own program</b>
<b>Logistics</b>	<b>Minimize cost</b>	<b>Optimize selectively</b>	<b>Secure sufficient stocks</b>

Figure 5: Kraljič (1983: Exhibit V).

Summarizing the implication of this analysis for our work, we can note that Kraljič introduces too many criteria for defining the market strength. It may look nice and relevant theoretically but in practice it is problematic to compare different measure units and evaluate weights which should be applied while trying to unite all these criteria in one meaningful index.

Additionally, in our paper we suggest that market attractiveness rather than market strength is a key element that defines the negotiation position and strategies based on game theory.

Furthermore, some segmentation criteria and associated strategies may be relevant for existing suppliers, but not for potential ones. We state that different segmentation based on different criteria should be applied for new suppliers, too. In the last exhibit there is clear lack of strategic implications for new, potential suppliers.

Finally, it seems to be questionable merging of PPM matrix fields with low-low market strength together with high-high market strength in one “balanced” category with identical strategic implications.

#### **4. Reverse BCG Matrix**

In this section we introduce the IFAMD Matrix for supplier segmentation. We start with shortly describing BCG matrix and showing how it is related to our supply market segmentation. Then we describe the proposed two – dimensional IFAMD supply market segmentation Matrix. We concentrate briefly on each dimension and then on 4 matrix fields.

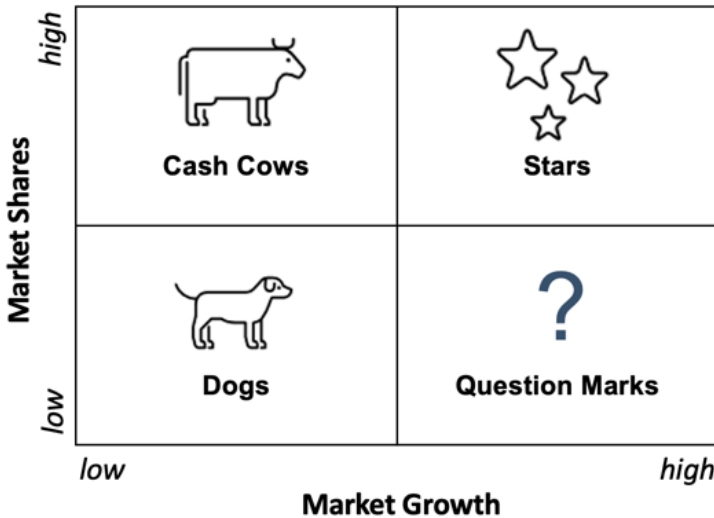
##### *4.1. BCG Matrix*

The Boston Consulting Group (BCG) growth-share matrix is a planning tool that uses graphical representations of a company’s products and services in an effort to help the company decide what it should keep, sell, or invest more in.

It is a two-dimensional Matrix and the products are divided based on the two dimensions of the market share, the brand’s share relative to its largest competitor, and market growth: a higher growth rate is indicative of accompanying demands on investment. This approach results in the creation

of four segments called cash cows, dogs, stars and question marks. For each segment, a suitable strategy is proposed<sup>3</sup> (see Figure 6).

The exact company strategies to follow in each segment are not relevant for our paper. What is much more interesting are the segmentation dimensions: an own market position vs the position of the opposite “side” of negotiation. Such clearly orthogonal division is used in the next subsection, where IFAMD matrix is introduced. Only, in BCG case we consider demand markets, and in our case, we segment supply markets. So, we can say that our matrix would be a “reversed” version of BCG: we keep similar dimensions, change from a demand/consumption market to a supply/providing market and, as a result of segmentation process, we aim to obtain optimal negotiation results for all segments of the matrix.



**Figure 6:** BCG Matrix.

<sup>3</sup> For cash cows it is to milk these products as much as possible without killing the cow. For dogs: remove any dogs from your product portfolio as they are a drain on resources. For stars, it can be the market leader though requires ongoing investment to sustain. And for the question Marks: it's not known if they become a star or drop into the dog.

## 4.2. IFAMD Matrix

By mirroring the BCG matrix to reverse marketing, the IFAMD matrix is a two-dimensional matrix which is based on the attractiveness of the buyer as own position in the market and market attractiveness (according to the market balance) as two dimensions. As you will see in the next section, such segmentation provides directly applicable strategies for the procurement process, all focused specifically on the preparation of negotiations and based on the modern game theory.

### 4.3. Attractiveness in the Market and Market Attractiveness

The attractiveness of the buyer's own business in a supply market is equal to the relative market share. It is measured in percentage and varies from 0 to 100 percent. We divide all supply markets into two groups along this dimension: Those where buyer's demand is relatively small ("replaceable customer") and those where buyer's demand is relatively interesting ("attractive customer") for suppliers.

Supplier Market Attractiveness is equal to the ratio of supply to demand over time. We use the volume of the supply and demand, not the number of players, even if the number of players is relevant for possible explicit or implicit collusive behavior because only the pure volume is relevant for the market balance between buyer's and seller's market. It potentially varies from  $-\infty$  till  $+\infty$  (calculating  $-\frac{\text{demand}}{\text{supply}}$  if  $\text{demand} > \text{supply}$  and  $\frac{\text{supply}}{\text{demand}}$  if  $\text{demand} < \text{supply}$ ) with a value equal to 1 for the equilibrium market, where the supply volume fits to the demand volume. We divide all supply markets into two groups along this dimension: seller's market and buyer's market. It is important to note that we can identify two levels of the market attractiveness. The first level is directly based on the available material. The second, more extensive level, is based on the potential production capacity. Which level is actual depends on the market structure and the time horizon that is relevant. If collusion is present (implicit collusion is typical if the number of suppliers is low and the number of buyers is high) the available material can be strategically artificially reduced by suppliers compared to the potential production in order to improve the negotiation position of suppliers.

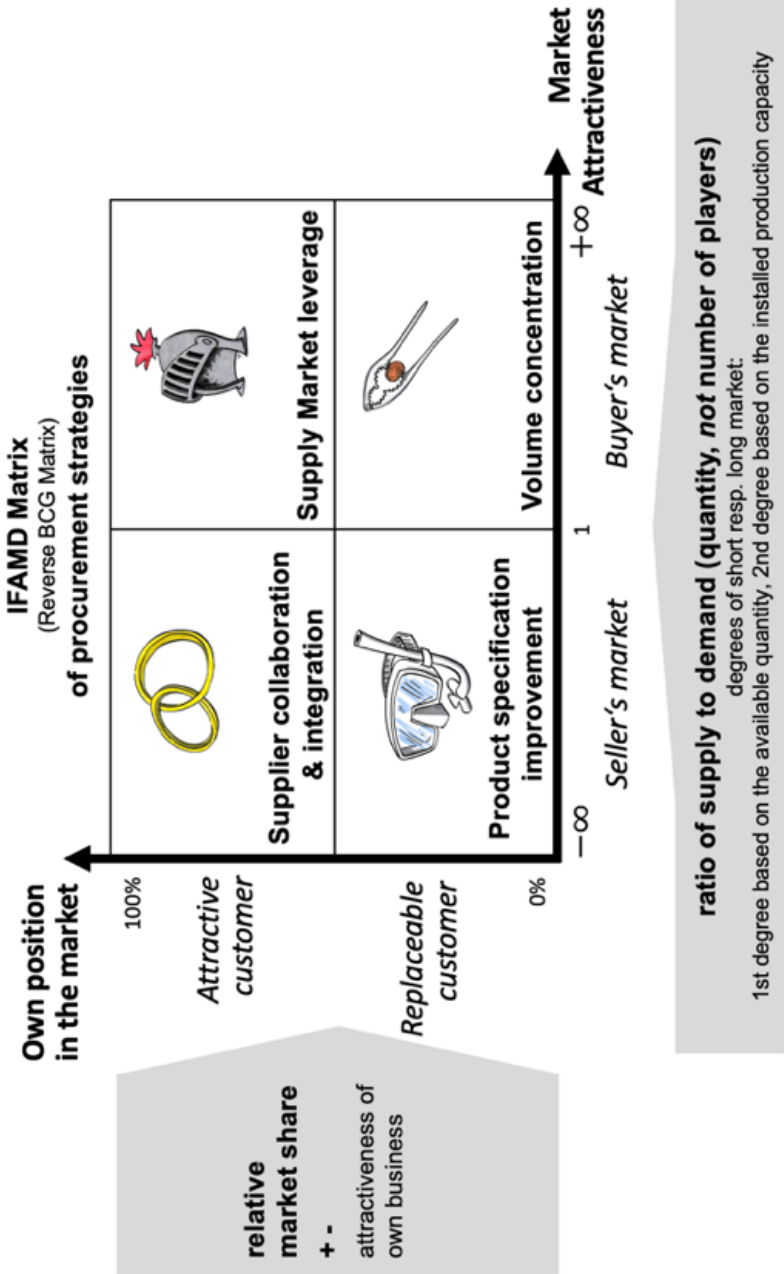


Figure 7: IFAMD Matrix.

#### 4.4. Matrix fields

There are four types of competitive situations (see Figure 7), which, according to game theory thinking, are basically to be treated with different negotiation mechanisms.

The names of IFAMD Matrix fields already hint on possible negotiation approach.

“Supply Market Leverage” occurs in a situation of interesting demand and buyer market. It is the best situation for the buyer, given a highly competitive market, in which the implementation of an auction promises success. Game theory then promotes the idea that clearly defined and openly communicated rules lead to each bidder optimizing his bidding strategy against the competition and thus also is in the interests of the auctioneer. The auctioneer fights with an “open visor”, so to speak.

A diametrically opposed situation is the one in which fair division with a trusted strategic partner delivers a much better sustainable result compared with the competitive situation. We call it “Supplier Collaboration and Integration” and it arises in the situation of interesting demand and seller market. Carefully distinguishing this situation from the others and deciding when it exists is often difficult for practical purchasing, since the buyer is not there to make friends. As a result, strategic partnerships based on trust often leads to the schizophrenic situation that the partner, who is highly valued in the rest of the company, is perceived by purchasing department as highly arrogant and treated as a problem case.

Very challenging situation, which we call “Volume Concentration”, occurs if we combine buyer market and small demand. Then it is to be assumed that the suppliers are not optimizing their individual bidding strategy but align together against the customer and the so-called implicit collusive behavior exists. It should then be controlled with sequential negotiation and decision-making processes, without price transparency in order to prevent a successful collusion.

The last field, “Product Specification Improvement”, is relevant in the seller market with a relatively small demand.

## 5. Implications for strategic measures

### 5.1. IFAMD 10 Steps

In this section we briefly describe an approach to systematically apply game theoretic ideas and mechanisms in preparation for price and contract negotiations which was introduced by Berz (2022).

The methodology consists of 10 steps, in the course of which it turns out whether, for example, you should conduct a cooperative negotiation with a strategic trusted partner or whether it is a hostile monopolist with whom a bilateral, non-cooperative negotiation is to be conducted. In the case of several potential suppliers, 10 steps reveal whether you can conduct a classic auction or whether you have to address an implicit collusion. In all these cases, the 10-step path (see Figure 8) also provides the final negotiation design and what must be done for the concrete preparation and execution of the negotiation process.

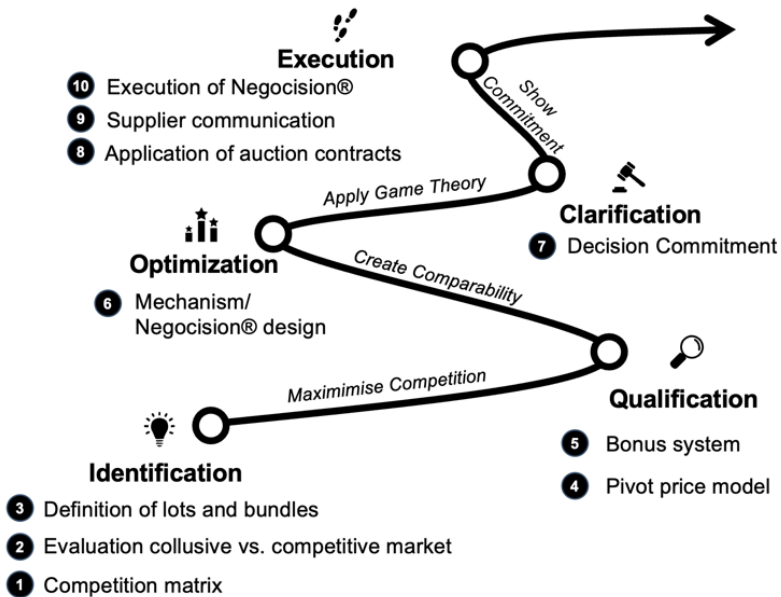


Figure 8: IFAMD 10 Steps

The first six steps all contribute to a management confirmation meeting in step 7, in which two contents essentially have to be agreed by decision responsible management: The comparative bonus system of the bidders



including a price model – to be developed in steps 4 and 5 – and a Negocision<sup>4</sup> mechanism, which provides both the price and the decision for the suppliers – to be developed in step 6. After a thorough analysis and discussion of the competitive situation of the bidders – steps 1 to 3 – the Negocision design is developed by the purchasing department and proposed in the approval meeting. Once approved, Negocision Design and Bonus System are translated into supplier communication consisting of two components: a presentation that is given to bidders in physical meetings – step 9 – and an award agreement or auction contract to be signed by both the customer and the suppliers before the start of the final award mechanism. The textual coordination of this award agreement with the internal legal service must take place before the supplier communication – therefore already step 8. Finally, in step 10, the Negocision mechanism is executed.

Theoretically, for every individual supplier-decision of strategic purchasing at the tactical level in terms of signing a contract on the purchasing side, the IFAMD 10 steps are to go through or at least to reflect. But it is not practicable to repeat steps 1 to 6 for each price negotiation in one and the same material field during the period of a procurement strategy. Rather, the results of steps 1 to 6 must be subject to the material field strategy in an annual or at most quarterly review process. Conversely, it is (only) the first 6 steps of the 10-step path that the procurement strategy must focus on for optimal implementation.

The critical point which influences the decision taken in nearly each step is the market type evaluation (step 2) – in this step the competitive situation is investigated. There are different types of competitive situations, which, according to game theory, are to be treated with different negotiation mechanisms. In the next section we, first, present the main result of this paper: the supplier segmentation based on the competitive situation. Then we discuss in details, for all proposed segments, the exact game theoretical implications for the decisions in the IFAMD 10 Steps process and how it would influence the negotiation preparation strategies and the final mechanism proposal.

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<sup>4</sup> “Negocision” is a neologism actually registered by IFAMD that means “Negotiation” and “Decision” in one and the same mechanism.

## 5.2. Twelve Tasks

In order to connect the IFAMD Matrix fields with the IFAMD 10 Steps, we introduce now the 12 main strategic tasks of strategic procurement. The 12 tasks are inspired by the idea of Balanced Scorecards for corporate strategies (Kaplan and Norton 1996). As the top mission of strategic procurement, all main tasks have to pay into ‘contract closing’ directly.

In order not to completely go beyond the scope of this paper, we are not presenting a complete ‘scorecard’ with a key figure system for procurement control. This is easy to develop by collecting a suitable key figure for each task. By the way, ‘Savings’ fits into this system as the top key figure for strategic procurement – as a key figure for the top task ‘contract closing’. In this paper, we draw inspiration from Balanced Scorecards only to ‘balance’ the tasks required of strategic procurement. However, the classic four perspectives that are used for corporate strategies in Balanced Scorecards cannot be used sensibly for an internal department of a corporation. With regard to strategic procurement, we recognize the competition matrix<sup>5</sup> as the decisive structure for success in contract closing, and all strategic procurement tasks must be aligned with its development and expansion. The competition matrix is defined in its most elementary form as a listing of all requirements in the rows and all potential sources of supply in the columns. So, it is precisely the columns and rows of the competition matrix that we use as the perspectives of the strategic tasks: the internal ‘Demand’ and the external ‘Supply’. In the following, we define six tasks for both perspectives (see Figure 9):

The first six tasks are relevant for the sources and cover the assignments which are related to the work with existence and potential new suppliers. In general, all these tasks are associated with work with and development of the available supplier base.

First four tasks are very basic and are related to the supplier portfolio. All of them are closely related to step 1 – the supplier portfolio is directly presented in the competition matrix. For all these four tasks the market type evaluation, step 2, is relevant as well – all work on development, increasing, optimizing the portfolio is directly related to the market situation. Moreover, all these four tasks have direct influence on the final mechanism design which is done in step 6.

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<sup>5</sup> Introduced in Berz (2022) as the result of the first of the IFAMD 10 Steps

**Strategic tasks concerning Supply**

(columns of the competition matrix):

	Strategic task # relates to IFAMD step:
<b>1</b> supplier portfolio	● 1 2 ● 4 ● 5 ● 6
<b>2</b> supplier development	● 1 2 3 ● 5 ● 6
<b>3</b> development of alternatives	● 1 2 3 ● 5 ● 6
<b>4</b> make or buy	● 1 2 3 ● ● 6
<b>5</b> shifting costs	● ● ● ● ● 5 ●
<b>6</b> frame contracts	● ● 3 ● 5 ● 6

**Strategic tasks concerning Demand**

(rows of the competition matrix):

<b>7</b> demand carriers (BUs, regions, sites, for certain materials)	● 1 ● 3 ● 4 ● 5 ● 6
<b>8</b> forecast quality / organization of forecast	● ● 3 ● 4 ● ●
<b>9</b> cost transparency / cost competence / market (development) competence	● 2 ● ● ● 5 ● 6
<b>10</b> logistic optimization / inventory / storage effect	● 1 ● ● ● ● 5 ● 6
<b>11</b> trade-off cherry picking versus bundling	● ● 3 ● 4 ● ● 6
<b>12</b> bundling over time (long term contracts), sliding price clauses (=index formulas)	● ● 3 ● 5 ● 6

**Figure 9:** Association between 12 strategic tasks and IFAMD 10 Steps

The main idea of the supplier portfolio task is to work with the available portfolio<sup>6</sup> and develop the relations with each specific supplier. Because of it, it is related to all first six steps, apart from lots and bundles definition: in this task we consider each supplier separately, so bundles are not relevant. All other steps are relevant for the individual work, including the bonus system which guaranties a sustainable long run relation with the supplier.

Supplier development is the task which is related with the development of the existing portfolio, but as a whole, and not individually with each

<sup>6</sup> We consider current suppliers as well as potential suppliers, who are already included in the portfolio.

member. The step which is related to the task now is step three: definition of lots and bundles. The price model is relevant for specific negotiation, but not for the development of the portfolio as a whole.

The development of the alternatives is the task which engages mostly in portfolio increasing: search for the new potential suppliers and modification of the portfolio while taking into account the competition matrix. As a result, suppliers' clustering can be created in order to optimize the bundling process. Again, nearly all steps are related to this task, apart from step 4.

Make or buy decision is, in some sense, the development of the alternatives as well, but a very specific one: in this task we consider two decisions. Either we outsource something that we used to produce or we insource something that we used to buy by an external supplier. This decision is connected to the same basic steps 1, 2 and 6. The possible bundling is essential for the final decision as well.

If one wishes to change the suppliers, the shifting costs may arise and, if high enough, may effectively prevent other suppliers to compete with the existing one. In this case the shifting costs would play a role of a bonus for the current partner. The task is to reduce the shifting costs as much as possible.

The last supplier side task is the development of proper frame contracts. On the one side, the frame contract can really promote long run sustainable relation for both sides. But, in some situations this is not necessarily the case, for example if it is a one-time deal and such contract is not free of costs. Moreover, in some situations two sides just cannot reach the agreement about the contract details. The frame contract details are directly relevant for steps 3, 5 and 6.

The other six tasks are related to the demand side, and cover the assignments related to the internal customers. The whole procurement process, starting from the developing of the competition matrix, is shaped by the demand produced by internal customers, who are responsible not only for generating the technical demand, but for the internal budget as well, which is relevant for price models and bonus systems.

The first task is demand carriers.<sup>7</sup> The main idea behind this task is internal relation management. One needs to take care that the internal demand is organized in such a way that it allows the maximal flexibility for the procurement. It can be connected with a flexibility to select the supplier – the demand is not limited to one specific supplier. Moreover, the buyers

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<sup>7</sup> BUs, regions, sites, for certain materials.

should be able to decide about bundling, price models and bonus systems, and not be limited by a very specific demand.

The next demand related task is the organization of a forecast and improving forecast quality. It is very relevant in a number of situations where the exact demand is not ex ante given. For example, considering the electricity demand, we can only produce the evaluation, but not commit to the specific amount. In such cases, the better the forecast is, the better conditions we can reach during the negotiations with a supplier. However, the more uncertain a forecast is, the more sensitive it is to work with a fixed price pattern that is to be determined in step 4.

The following task is cost transparency and cost competence. The internal customer should be aware of the production process, production costs, raw material costs and quality costs of a products he wants to order. This allows to evaluate a realistic price and to estimate the true cost position of the supplier which is of immense importance for steps 2, 5 and 6. Such competence should be strategically build and developed as well.

The logistic optimization including inventory and storage effect tasks influences the demand flexibility: if the logistic can be organized with higher flexibility and if storage over longer time becomes feasible, then it allows much more flexibility in negotiations with suppliers. One can consider it as bundling over the time, which can be essential if the markets are volatile.

In trade-off cherry picking versus bundling, based on the market evaluation regarding (implicit or explicit) collusion, and discussion with the internal customer, we should decide if some suppliers who propose lower prices are really specializing in these goods and have more efficient production process or if we deal with price manipulations in an implicit (or even explicit) collusive environment. There are some ways to evaluate a market situation, and the competence of internal customers can play a conclusive role in the decision process. Moreover, if we decide for bundling, the internal customer can participate in constructing bundles as well.

The last task is bundling over time (long term contracts) and sliding price clauses (index formulas). Long term contracts are a very convenient way to increase own attractiveness in a sustainable way and improve the negotiation position. In volatile environment the proper index formulas should be used to reduce the risk in promoting risk sharing.

All twelve tasks form the strategic assignments' list which, applied usually on the material group level, serves to the strategic goal – increase

the own market attractiveness, increase own market power and improve bargaining position in a sustainable way for a long period.

In the next section we will show how the strategic implications of IFAMD supplier segregation relate to the 12 strategic tasks, which, in turn are associated with IFAMD 10 Steps for negotiation preparation as described in Figure 9. Note, that the relevant steps for our discussion are steps from 1 to 6, where finally the Negotiation mechanism is developed.

### 5.3. Strategic Implications

In this section we identify recommendations for the procurement department which come out of IFAMD supply market segmentation. We propose a number of concrete norm strategies to be taken for each out of four matrix fields. Opposite to the 12 tasks which are universal and support any negotiation preparation, the norm strategies are specific and depend on the IFAMD Matrix position. But their content is related to the strategic task, introduced in the previous section. Moreover, through these tasks one can relate the norm strategies to the 10 IFAMD Steps negotiation preparation approach.

Before we describe the standard strategies of the individual fields in detail, we would like to point out an overarching strategy that plays a central role in strategic procurement: bundling. While on the buyer’s market side an entire field is named: “Volume Concentration” (when the own demand volume is small), bundling does not only not occur on the seller’s market side, but it must also be explicitly warned against: large demand volumes expose the buyer in the seller’s market and actually have to be unbundled in order to be able to cover needs in a narrow market!

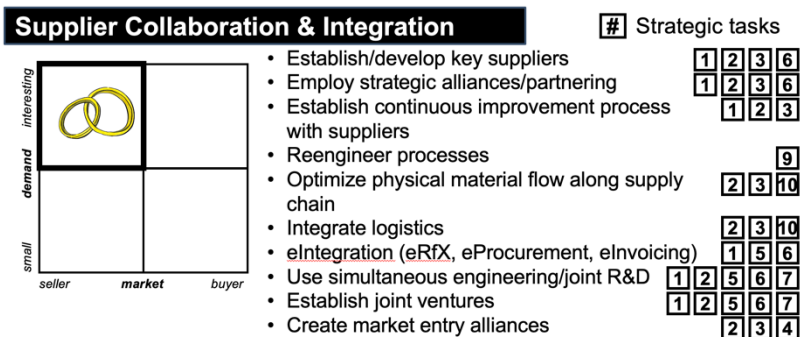
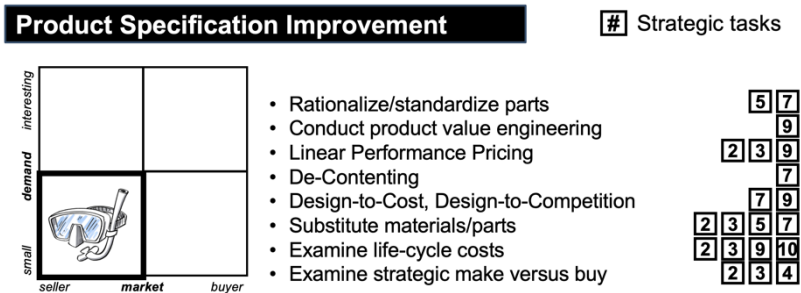


Figure 10: IFAMD Matrix field “Supplier Collaboration & Integration”

Let’s start now with the Supplier Collaboration and Integration field. As you can see in Figure 10, most of the norm strategies to be taken are related to the first three strategic tasks – active work with a supplier portfolio. The norm strategies like “Establish/develop key suppliers”, “Employ strategic alliances/partnering”, “Establish continuous improvement process with suppliers”, “Establish joint ventures”, “Create market entry alliances”, “Use joint R&D” speaks for themselves – they actively encourage close collaboration, while developing the supplier portfolio. Most of these norm strategies are related to frame contracts task as well. “Joint R&D”, “eIntegration” and “joint ventures” are relevant for make or buy decision and demand carrier tasks. All these norm strategies should improve relationship with the supplier by building different links, tying the supplier and establishing different types of integration. The main goal is to promote a long term and sustainable partnership.

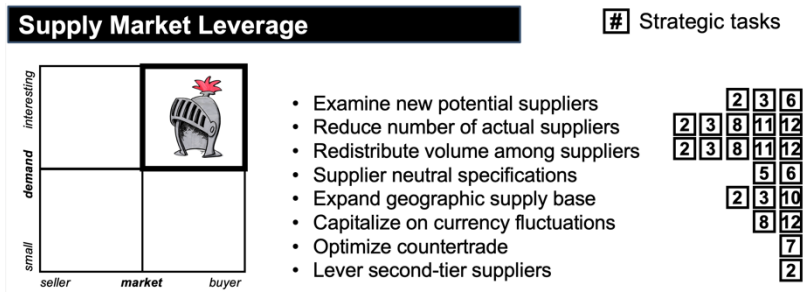
The idea behind “Reengineer processes” is to regularly examine the production process to improve cost transparency and cost competence and is related to task 9. Next two norm strategies are “Optimize physical material flow along supply chain” and “Logistic optimization”. They imply bilateral optimization and are related to the portfolio development, tasks 2 and 3, and task 10.



**Figure 11:** IFAMD Matrix field “Product Specification Improvement”

Afterwards we move to the most problematic field from the buyer perspective: Product Specification Improvement. The buyer’s own attractiveness is low and we are in the supplier market. As you see in Figure 11, there are no norm strategies in this field which are related to task 1 – there is no lever that makes work with the current supplier portfolio successful. On the source side, some norm strategies are related to tasks 2,

3, 4 or 5. In all these tasks we look for different alternatives and substitutions. On the demand side “Rationalize/standardize parts”, “De-Contenting”, “Design-to-Cost” and “Design-to-Competition”, “Substitute materials/parts” all are related to task 7. The idea is again to look for alternatives from the demand site which can help in this difficult situation, to amend production processes if there is such a possibility. “Rationalize/standardize parts”, “Conduct product value engineering”, “De-Contenting” and “Substitute materials/parts” norm strategies are related to task 9. In this Matrix field it is essential to know exactly the value and to manage the value chain of all products to buy.

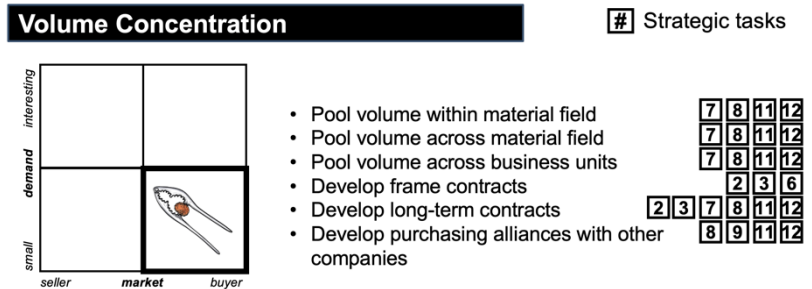


**Figure 12:** IFAMD Matrix field “Supply Market Leverage”

Now, let us move to the Supply Market Leverage field (see Figure 12). As we have already mentioned, it is the most convenient position for the buyer – it is an attractive client in the buyer’s market. The whole machinery of the game theory should be used in order to exploit the competitive market structure advance. “Examining new potential suppliers”, “Reducing number of actual suppliers”, “Volume redistribution among suppliers”, “Expanding geographic supply base” and “Levering second-tier suppliers” norm strategies are related to the sources task 2 and 3. The objective is to increase the base of potential suppliers and to decrease the number of actual suppliers. Such combination gives the maximal advantages in negotiation process. “Supplier neutral specifications” play an important role in decreasing shifting costs, which is important, because in this field the buyer should have the flexibility to shift quickly at the minimal cost. Moreover, the frame contracts should be neutral as well. From the demand side, “Reduced number of actual suppliers”, “Volume Redistribution among suppliers”, and “Capitalization on currency fluctuations” norm strategies



are important for improving forecasts and bundling decisions. Finally, “Optimization of counter-trade” is the assignment for demand carrier.



**Figure 13:** IFAMD Matrix field “Volume Concentration”

The final field is Volume Concentration (see Figure 13). Even in the buyer market, a small, non-attractive buyer can face problems with implicit collusion of the suppliers. The classical game theoretical solution in such situations is to pool volume in any possible way and along any dimension in order to reduce potential for any split of the own business between implicit collusive suppliers. “Pool volume within material field”, “(...) across material field” and “(...) across business units” are related to the demand tasks. The demand carriers should provide the buyers with a maximal flexibility to bundle. The possibility to bundle should influence the frame contracts and, if possible, long-term contracts should be considered, which is bundling along time dimension. Finally, forecast quality and cost transparency are essential for creating purchasing alliances.

## 6. Conclusions and Outlook

In this paper we introduced a new approach to Procurement Strategies and Supply Market Segmentation. Each segment of the IFAMD matrix implies different patterns of the own attractiveness of the buyer and the market attractiveness for the buyer. Then the segmentation is used in designing the specific and highly practical norm strategies to be implemented during 12 tasks to be performed in Strategic Procurement. Each task in its turn is related to one or more of the IFAMD 10 Steps that fulfill the negotiation preparation process, based on the game theory implementation. As a result, we aim to achieve the best negotiation results for the buyer.

The approach provides the missing link between the literature concentrating on different methods of supplier segmentation and the modern game theoretical approach to procurement. Moreover, the approach is practice oriented and creates a valuable, ready to use tool for procurement strategies.

The IFAMD 10 Steps methodology to apply game theory in procurement was successfully used in the practice in IFAMD procurement projects since almost twenty years (Berz 2022). With the IFAMD Matrix presented here, the application of game theory in procurement is anchored in the procurement strategy. Incidentally, the intermediate step of the 12 tasks of strategic procurement provides a basis for a new key figure system for procurement control, which may be highly compatible with the application of game theory in procurement.

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Edited by  
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game theory insights

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