The State of Artificial Intelligence: Procurement versus Sales and Marketing

Purpose: Sales and procurement are the main boundary spanning functions of an organization – each with a specific focus and partly different views and objectives. They are often considered as two sides of a coin that struggle with one another for relative competitive advantage. The digitalization of procurement functions and the introduction of enterprise resource systems have led to a seeming data abundance. However, the results especially in the area of artificial intelligence are not yet satisfactory in practical application. In addition, few academic works are steered towards procurement. In fact, some expect that procurement is less likely to benefit from the application of methods of artificial intelligence (AI) emphasizing the potential benefits in functions such as finance, production, marketing and sales. Why is that? What can we do about it? Or is it even a bad thing after all?

Methodology: Explanatory study considering the needed decisions and available data of procurement in contrast to sales and marketing. The manuscript is structured in three sections based upon the "Memorandum of Design-Orientated Business Informatics" with analysis, draft, evaluation and diffusion (Österle et al., 2010).

Findings: There is a need for research on the purchasing-marketing interface, not just for AI but also for AI applications and analytics in general. Procurement scholars and managers must speed up data and analytical development, especially since our negotiation partners are benefiting from the rapid development of AI technology. Five propositions have been derived from a master thesis analyzing the needed decision and available data as well as during discussions at the 2021 European Research Seminar to facilitate practical application for management and direct further research. These are more perceived value, more data, better technological solutions, more skills and training, and different role in the value chain.

Originality: This is an original work of in-progress research.

1 Analysis

Artificial intelligence (AI) is a research area that attempts to design mechanisms allowing machines to develop intelligent behavior (Russell et al., 2009). In McKinsey's (Balakrishnan et al., 2020) as well as Deloitte's (Ammanath et al., 2020) "The state of AI" survey the business functions in which organizations adopt AI are over time largely consistent with service operations, product development, marketing and sales. Since sales seem to have a faster pace, procurement must speed up in the analytics race (Chae et al., 2014, Allal-Chérif et al., 2021). Why, for instance, is procurement not at large using AI for supplier risk assessment when sales is using AI for demand forecasting?

For big data analytics in general, research has shown that procurement is also lagging (Nguyen et al., 2018, Vollmer et al., 2019). Searches on academic and popular databases utilizing keywords such as procurement as well as sales and marketing respectively with artificial intelligence / machine learning / big data analytics further indicate that there is more research and application in sales and marketing. In addition, there are many search hits, what salespeople can learn from buyers but interestingly not the other way around. Maybe now is the right time to turn the coin on the other side also from a procurement perspective! One example is an article in the magazine Spend Matters, which urges management to concentrate on information sharing throughout the value chain with common metrics. Based on data from the Association of National Advertisers in the United States of America in the article it is highlighted that while marketers are concerned with strengthening marketing performance, buyers are focused on reducing costs and making internal processes less risky and more efficient (Wyld, 2014).

Research question: Why is procurement lagging in AI adoption versus marketing / sales?

Procurement as a discipline sometimes still feels inferior to other disciplines, however, that is not per se a good enough reason to compare and postulate that procurement should be as advanced, i.e., there could be supply chain alignment reasons. Technology adoption processes, in general, have been divergent (Venkatesh et al., 2003), and no commonly accepted view exists still today. On the contrary, there are numerous models available, some of which complement each other and some that are contradictory (Mahlamäki et al., 2021). It could also be a matter of internal integration as the use of AI

in sales and marketing somehow influence the use of AI in procurement. Some view purchasing as reverse marketing (Leenders and Blenkhorn, 1988). In this sense, this work contributes to the management of the purchasing-marketing interface, provides practical ideas, and directs future research.

2 Draft

Procurement and sales are the main boundary spanning functions of an organization - next to human resources on the labor market and finance on the money market - each with a specific focus and partly different views and objectives (Katz and Kahn, 1978). There is, in general, more visibility internally and externally on sales and marketing that for instance has a seat on the board of management of almost every organization, which is not yet true for procurement. In many buying organizations today, data is often still not recorded in a consistent and strategic manner and, generally, there are more solution providers for customer relational management than for supplier relationship management (Guida et al., 2021). Overall, sales and marketing seem more professionally developed, e.g., training expenses for salesmen are several times higher than for buyers (CAPS Research, 2014).

Digitalization changes both buying processes and sales processes and, consequently, the dynamics and division of work between buyers and suppliers in the supply chain. This has major implications for industrial marketing and supply chain management (Mahlamäki et al., 2021). Procurement can be defined as the acquisition from an external source at the best possible cost to meet the needs in terms of quality, quantity, time, and location and must deal with conflicting targets including time, cost, and quality constraints (van Weele, 2018). While marketing is the process by which companies engage customers, build strong customer relationships, and create customer value in order to capture value from customers in return (Kotler and Armstrong, 2018), sales is generally considered to be part of marketing and can be defined as a business system required to effectively develop, manage, enable, and execute a mutually beneficial, interpersonal exchange of goods or services for equitable value (ATD, 2008). Now, what are the differences between these functions? By consideration of the industrial buying

process model as well as the comparison between consumer markets and industrial markets (van Weele, 2018), the needed decisions and available data are summarized in the Table below along the strategic, tactical, and operational levels:

Table 1: Comparing procurement with sales and marketing along the needed decisions and available data on the strategic, tactical, and operational level

Dimension	Procurement		Sales / marketing	
	Decisions	Data	Decisions	Data
Strategic	Value network	Overall costs and quality	Value proposition	Overall profits and revenue
Tactical	Supplier selection	Achieved savings	Project bidding	Achieved projects
Operational	Supplier evaluation	Performance measurement	Project control	Performance measurement

Thus, five propositions were derived by contrasting and comparing the needed decisions and available data in a master thesis at the University of Mannheim (Zhong, 2021) as well as during discussions at the 2021 European Research Seminar (Spreitzenbarth et al., 2021a). These are more perceived value, more data, better technological solutions, more skills and training, and different role in the value chain described in this chapter.

2.1 Proposition I "more perceived value"

The digitalization of procurement and the introduction of electronic procurement has led to a seeming data abundance. Yet, few contributions are steered toward the implementation of AI in supply management (Moretto et al., 2017, Handfield et al., 2019). For instance, AI methods can reduce the time spent in unnecessary negotiation, and thus improve negotiation efficiency (Son et al., 2014). A digital twin of a salesperson can be used to train and improve decisions (Karlinsky-Shichor and Netzer, 2019) to evaluate whether a bid should be accepted or rejected (Zhang et al., 2014). However, in a study with machine learning models for sales predictions, the role of procurement was only

described by only one attribute namely whether the procurement department is involved in the sales opportunity (Bohanec et al., 2017). Therefore, there is a need for procurement scholars and managers to speed up data and analytical development, especially when the negotiation partners are benefiting from the rapid development of AI technology (Nowosel et al., 2015, Handfield et al., 2019, Schulze-Horn et al., 2020).

At the 2021 IPSERA conference, a review of artificial intelligence and machine learning in procurement was presented in which eleven use case clusters were assigned along the strategic, tactical, and operational level illustrated in the Figure below:

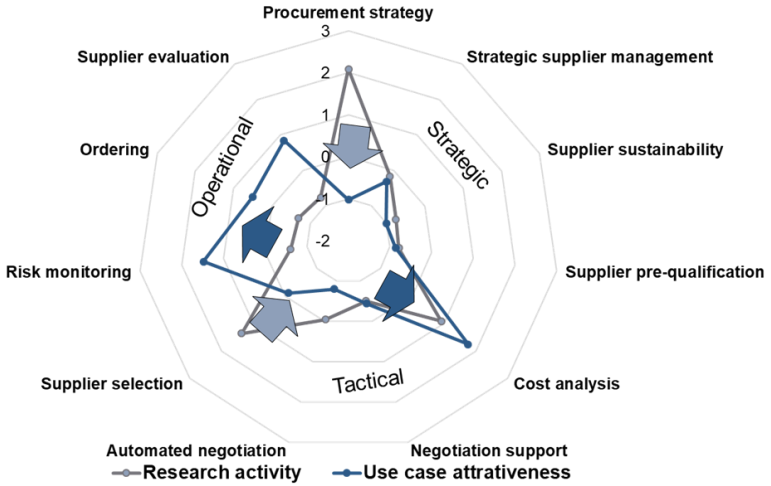

Figure 1: Research activity and attractiveness in standard deviations (Spreitzenbarth et al, 2021b)

Based on this analysis, the most attractive use cases seem to be cost analytics and risk management. AI methods may be applied to pricing behavior analysis, raw material price forecasting, in-depth comparison of offers, benchmarking, and tiered pricing proposals (Maltaverne and Dieringer, 2017). Considering Kraljic's classification (Kraljic, 1983) for

requisitions with low supply risks, use cases such as supplier scouting as well as automated negotiation are probably more relevant while risk monitoring is essential for high supply risk requisitions. For instance, the German start-up riskmethods has developed a solution to anticipate purchasing risk (Enthoven, 2020). Advantages are, for example, the ability to act quickly based on keyword and location search - especially with complex sub-supplier management such as semiconductors. In addition, a world café was conducted at a German automotive manufacturer where twenty experts discussed the potentials of AI for purchasing indicating that AI methods can facilitate mechanism design-based negotiations (Schulze-Horn et al., 2020).

In sales and marketing, AI can be used from price optimization, forecasting, up-selling and cross-selling, to performance management. If data is the new oil, those who can generate actionable insights will be able to close more deals, more often (Antonio, 2018). AI excels at solving problems for customer relationship management (Nam et al., 2019). Swift data processing provides the opportunity to monitor markets in real-time (Xu et al., 2016). In addition, AI methods can find patterns in data and develop new business models to secure customer relationships (Syam and Sharma, 2018). Thus, projects in sales and marketing utilizing data to optimize what products and services should be offered at which price can directly increase revenue and profit margins. The business case of analytics projects in procurement is in practice more difficult to justify as it often leads to process quality improvements that provide value to the organization but are more difficult to measure. Therefore, this could contribute to sales functions adopting the technology sooner than procurement from a financial perspective.

To sum up, there seems to be the perception that AI in sales and marketing contributes a higher value proposition to the organization than AI in procurement. However, this may change in time if more data, technology, and training lead to a higher perceived value proposition. **Recommendation I**: Consider closely the value that procurement delivers to the organization when evaluating where to invest in data, technology, and skill.

2.2 Proposition II “more and better data”

AI techniques are based on one of the most important building blocks, data. In procurement much data is generated (Handfield et al., 2019); however, available data is

not always enough to have an overall view (Connaughton and Sawchuk, 2017). For example, external data not yet readily available could help to anticipate delays in the supplier production cycle, sudden changes in the raw materials market or regulation (Brintrup et al., 2019). Many procurement practitioners, consultants, and academics report that important data is not gathered in a sufficiently consistent and strategic manner in order to make it useful for advanced analytical techniques (Handfield et al., 2019, Spreitzenbarth et al., 2021b). For instance, if data for quality defects or logistics costs is not linked to the project, this may hinder gaining a deeper understanding based on data to make better decisions in the future. Thereby, data quality is an important aspect that has been highlighting as a major roadblock for AI implementation in procurement (Hazen et al., 2014, Chopra, 2019, Guida et al., 2021).

Organizational information processing theory compares information processing needs with information process capabilities (Galbraith, 2014). The competition between sales and procurement is also the competition between the amount of valid information and the means to interpret this information. Sellers most likely understand their products better than the buyers, hence creating an information asymmetry. Today, buyers typically spend over half of their time on transactional activities (Vollmer et al., 2018). As highlighted in the Spend Matters article in the previous chapter, data sharing and data integration with supply chain partners along the network could be one way with high-level supplier integration may lead to more data with a higher degree of data quality, i.e., for better demand forecasting leading to process improvements in the whole network (Huber and Stuckenschmidt, 2020). For example, the Chief Information Officer of Porsche, Matthias Ulbrich highlighted the importance of demand forecasting for functions spanning from sales, procurement, and production (MIT Sloan, 2020).

To sum up, there seems to be more data with higher quality for AI in sales available. However, procurement can design the tendering process and actively manage the expectations of the internal and external stakeholders. **Recommendation II**: Gather data with a consistent strategy aligned with the overall strategy where especially data sharing within the value chain is one interesting way to obtain better information.

2.3 Proposition III "better technological solutions"

Supplier relationship management (SRM) and customer relationship management (CRM) are increasingly utilized to obtain, store, and analyze data (Chopra, 2019). Thereby, important SRM and CRM systems such as SAP, Oracle, and Salesforce provide not just an information system but an ecosystem (Straub et al., 2021). Procurement normally can only take part in the business-to-business (B2B) market while sales can also take part in the business-to-customer (B2C) market. Given that the number of customers in the B2B market is normally smaller than in the B2C market (Hallikainen et al., 2020), in general, more data is available for scholars and firms in the sales area. Some CRM solution providers such as XiaoE Tech from China offer flexible application programming interfaces so that their systems can be linked to other platforms such as social media (Zhong, 2021). The coverage of the B2C market creates a cross-sector cooperation opportunity between the social media companies and sales functions.

The solution provider Celonis highlights use cases in procurement for process mining and optimization, e.g., a case study of 279.000 orders that have been loaded into a to-be process model. A conformance checker scans the actual process, providing key statistics about the conformance and a list of violations sorted by their frequency. Thereby, on average the throughput time of non-compliant cases was significantly higher than of compliant cases (Veit et al., 2017). Another example is SAP NetWeaver, which also provides real-time insights into the process data. For instance, when purchasing new material, users can evaluate the delivery performance to choose the best-performing vendors. As another example from China, Fitow offers supply chain quality management services for the automotive industry. It developed an early warning system for quality defects giving the buying organization an information advantage (Zhong, 2021).

AI methods can intelligently find and extract information across thousands of sources (Chopra, 2019). For example, the German start-up Scoutbee focuses on identifying potential new suppliers through search methodologies (Scoutbee, 2021). Another start-up from Germany, Botfriends, is providing chatbots for use cases from providing requestor support to order handling, automated negotiation, and billing support (Botfriends, 2021). The multinational corporation Siemens is utilizing a sourcing bot that finds the contracted rate, provides the next best available rate or the option to start a

new request for quotations (Straub, 2019). Automated negotiation is likely to play an important role in future buyer-supplier relationships change the types, design, and frequencies of interactions between organizations (Schulze-Horn et al., 2020).

Furthermore, procurement could utilize CRM tools such as Salesforce to manage actively internal and external stakeholders (Conga, 2020). Currently, the majority of procurement organization's supplier risk assessment and supplier collaboration are time-consuming activities. Mirroring email marketing automation could help to automate an operational task while developing a foundation of insight for strategic decisions (Jenks, 2019). In addition, a world café was conducted during the Ph.D. project of an Italian colleague with thirteen experts followed by a questionnaire comparing and highlighting emerging AI-enabled service platforms such as Suplari AI-Automated Analytics & Insights, Coupa Risk Aware, and Zycus Merlin AI Suite (Guida et al., 2021). Another colleague described five case studies of AI technology in procurement: Firstly, Synertrade provides automation and optimization of purchasing processes. Secondly, Siley develops a global matching system that links purchasing requests to suppliers. Thirdly, the widely used software suite SAP Ariba for data analysis and decision support. Fourthly, the SRM provider Jaggaer that supports the management of supplier relations. Lastly, Ideapoke facilitates collaborative project management and open innovation (Allal-Chérif et al., 2021).

To sum up, there seems to be better technology for AI in sales available than for AI in procurement. However, there are interesting solutions available from startups and providers are extending existing tools with AI capabilities. **Recommendation III**: AI adoption should be seen as a long-term process of constructing an ecosystem whereby choosing the right technology partners is key to future success where in particular utilizing tools such as Salesforce could be a leapfrog for procurement.

2.4 Proposition IV "more skills and training"

Having both the domain knowledge and the technology toolbox is an important skill set for future buyers (Chopra, 2019). Analytical methods allow the firms to enhance their decision quality during business operations (Gunasekaran et al., 2017, Balakrishnan et al., 2020). Talent gaps could be a possible factor that prevents procurement from implementing and fully utilizing AI (Schoenherr and Speier-Pero, 2015, Ammanath et al.,

2020); however, this also holds true for sales and marketing. A data-centered decision process can be applied in different ways; however, the actual implementation is still far from mature (Guida et al., 2021). Hence, procurement needs to change the decision-making culture and speed up the digitalization process (Batran et al., 2017, BME, 2018, Shefford and Holland, 2018).

AI can lead to a different approach of purchasing, more agile, reactive, and efficient. Buyers can focus on more strategic and creative missions putting purchasing at the heart of innovation (Allal-Chérif et al., 2021). Overall, sales and marketing are seemingly more professionally developed, e.g., training expense for salesmen is several times higher than for buyers (CAPS Research, 2014). The example of Fitow shows that human intelligence such as senior workers combined with AI can be an efficient way to break down the information barrier between different sectors. Humans are strong in integrating information from different sources generating insights (Saenz et al., 2020).

To sum up, buyers are in general skilled in data analysis and used to learn new skills and techniques - just like people in sales roles. **Recommendation IV**: Set up organizational structures and processes to effectively combine human skills and artificial intelligence to achieve maximum efficiency with human-AI collaboration.

2.5 Proposition V "different role in the value chain"

The positioning in the value chain is important to sustain competitive advantages (Porter, 1998, Walters and Lancaster, 2000). One important aspect is the risk-averse and cost-focused identity, which hits the mark of procurement self-perception and external valuation (Murfield et al., 2021). Since procurement is at the beginning of the value chain, any disruptions passed down the value chain may lead to fatal results (Bode et al., 2011). Hence, the change management of implementing AI in procurement might be more demanding than sales. As an example, Nike implemented a new enterprise resource system, which led to a severe disruption along the supply chain. Managers tend to avoid abrupt changes in technology or may even develop algorithm aversion (Dietvorst et al., 2018). Moreover, buyers are often still associated in the organization with negotiation and a narrow view of trying to achieve better prices at all costs.

The value proposition of procurement can be increased by bundling various demands. However, in complex organizations such as the Volkswagen Group, cross-supplier potential is not always visible until the final decisions' committees, often too late to achieve further savings. A system was drafted that takes as an input the sourcing planning from different formats across the organization, and generates recommendations to bundle requisitions, e.g., through Word2Vec similarity analysis that can be assessed, e.g., through factor machines along with three vectors projects, components or services, and suppliers visualized below (Spreitzenbarth et al., 2021c). By evaluating the bundling options, feedback can be used to train the scoring model through supervised learning, e.g., logistic regression. Next to savings, the communication between the teams may lead to further process efficiencies. In addition, the bundling generator could be part of a larger AI module adjunct to the tendering system, for instance, to propose potential bidders. Yet, this approach requires transparency within the organization to succeed with openness to share information, openness for joint negotiations, and the openness to share the savings (van Weele, 2018).

To sum up, the perception of procurement with a risk-averse cost-focused identity (Murfield et al., 2021) seems to play a role in the adoption of AI and more generally analytical tools. This also pertains to the external valuation of the function that is important to obtain managerial support in investing in skill development, new technology, and data foundation. **Recommendation V**: Develop the skills, technology, and data in procurement functions to provide more value to the organization.

3 Evaluation and diffusion

AI can lead to a different approach of purchasing, more agile, reactive, and efficient. Buyers can focus on more strategic and creative missions putting purchasing at the heart of innovation (Allal-Chérif et al., 2021). If procurement wants to catch with sales on analytical maturity, it may be the right time to reconsider the often still risk-averse cost-focused identity (Murfield et al., 2021). In addition, there are many search hits, what salespeople can learn from buyers but interestingly not the other way around. Maybe now is the right time to turn the coin around to learn from another also from a

procurement perspective. As an example, procurement teams could utilize customer relationship management tools such as Salesforce to manage actively internal and external stakeholders (Conga, 2020). This can lead to stronger business partnerships strengthening its position within the organization. Furthermore, it is paramount for supply management to further utilize data sharing within the value chain. In the Figure below, the relationship of the five prepositions developed is presented:

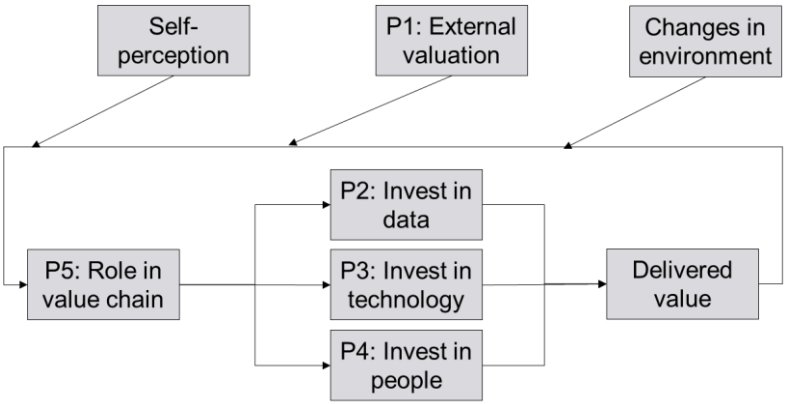

Figure 2: Combine the propositions into a feedback system (own illustration)

Now, how can we break out of this cycle? Procurement managers and scholars need to take risks to update outdated systems and try creative new ways – AI is a potential game-changer for procurement, which requires abrupt changes in technology and trust in data-driven analysis and decisions. Buyers are generally skilled with analytical understanding and like to dig into the numbers in order to find new innovative approaches to be able to improve organizational processes across the value chain, reduce overall costs, and ensure supply in-time, in-quality. If this potential is fully utilized, scholars might be asking the reverse question “how did procurement suddenly become the analytical champion within the organization”? This process might start by looking inside at the role of procurement within the organization and across the organizational boundaries to

convincedly communicate the need to invest in data, technology, and people – or it might be due to the reconsideration of organizational priorities, e.g., due to supply chain challenges - or due to changes in the organizational environment, e.g., by adapting to the technological advances of our negotiation partners in sales and marketing functions. In closing, to briefly summarize the five recommendations to further drive AI research and application in procurement derived from the developed propositions in this work:

- Consider closely the value that procurement delivers to the organization when evaluating where to invest in data, technology, and skill.
- Gather data with a consistent strategy aligned with the overall strategy where especially data sharing within the value chain is an interesting way to obtain better information.
- AI adoption should be seen as a long-term process of constructing an ecosystem whereby choosing the right technology partners is key to future success where in particular utilizing tools such as Salesforce could be a leapfrog for procurement.
- Set up organizational structures and processes to effectively combine human skills and artificial intelligence to achieve maximum efficiency with human-AI collaboration.
- Develop the skills, technology, and data in procurement functions to provide more value to the organization.

There is a need for further research on internal integration and the purchasing-marketing interface, not just for AI but also for AI and broadly analytics. Procurement scholars and managers must speed up data and analytical development, especially since our negotiation partners are benefiting from the rapid development of AI technology. A prominent example is automated negotiation is likely to play an important role in future buyer-supplier relationships changing the types, design, and frequencies of interactions between organizations (Schulze-Horn et al., 2020). In addition, startups develop interesting solutions such as riskmethods to anticipate purchasing risk (Enthoven, 2020) or Scoutbee to identify potential new suppliers (Scoutbee, 2021). The examples of Celonis, XiaoE and Fitow, Suplari, Coupa, Zycus, Synertrade, Siley, SAP, Jaggaer, and Ideapoke further showcase the potential of artificial intelligence in procurement functions. Thus, we believe that the research fits well with the Hamburg International Conference of Logistics and would be glad to discuss this ongoing research with you!

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