The State of Artificial Intelligence

Procurement versus Sales and Marketing

HICL Conference digitally on September 23nd, 2021

Presented by Jan Martin Spreitzenbarth, External Ph.D. Student, University of Mannheim
Together with Prof. Dr. Heiner Stuckenschmidt and Prof. Dr. Christoph Bode

About the researcher Jan Martin Spreitzenbarth

Key facts

- Since 2018 External doctoral student in the Data and Web Science Group at University of Mannheim
  Supervised by Prof. Dr. Heiner Struckenschmidt with support of Prof. Dr. Christoph Bode
- Research interest in the **application of artificial intelligence and machine learning in procurement**
  First paper predicting TCO for supplier selection (ERS 2020 / AACE 2021)
  Second paper review of AI and ML in procurement (IPSERA 2021) vs sales (ERS and HICL 2021)
  Third paper simulation workflow (ISDC 2021) with bundling module (EurOMA 2021)
- Since 2016 Buyer at Porsche for infotainment, embedded software, currently requirement management
  Led by Thomas Pichler and Stephanie Bach, sponsored by Joachim Scharnagl

Last stations in the CV before joining Porsche

2014 - 2015 **Post-graduate scholarship with German Academic Exchange Service DAAD in China**
Language study in Beijing and IT consultant for an Industry 4.0 project (Smart Factory)

2012 - 2014 **Master degree at Karlsruhe Institute of Technology with IBM in Germany**
MSc in industrial engineering and project buyer of smart meters in Mainz (Smart Home / Smart Energy)

2011 - 2012 **Gap year at Robert Bosch in Germany**
Logistics planner for solenoid valves and metering units at plastics engineering plant in Waiblingen

2009 - 2011 **Bachelor degree at Simpson College in the USA**
Intern at a local automotive supplier in Iowa as well as for an United States Senator in Washington, D.C.

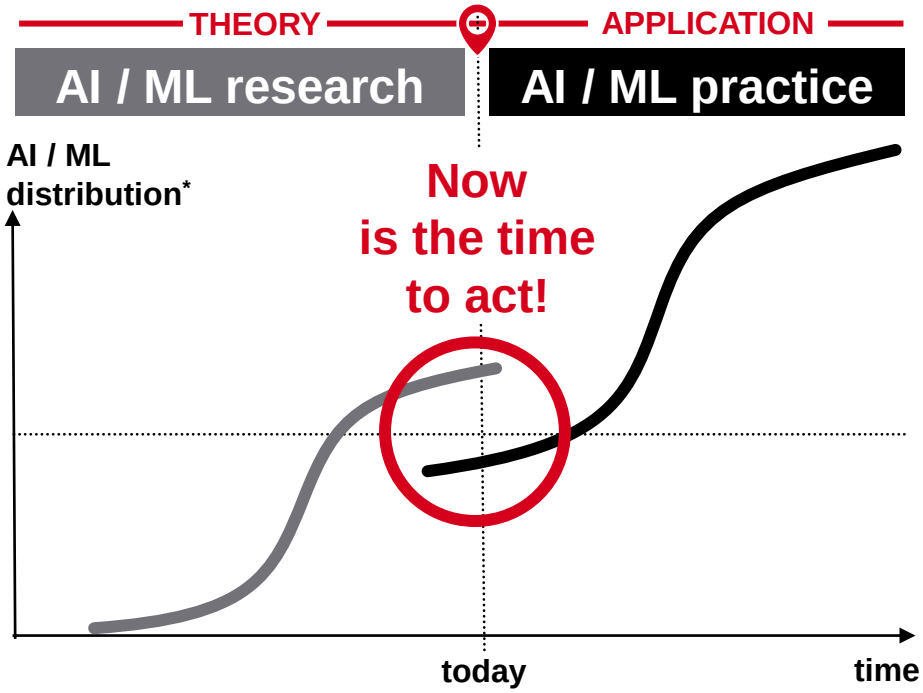
Interests

- Team sports e.g. soccer, basketball, and volleyball
- Travel, languages, and cultures especially Asia
- Nature, hiking, climbing, wine, and horticulture

I am looking forward to an interesting discussion with you today!

Note: AI=artificial intelligence, ML=machine learning, TCO=total cost of ownership

Artificial intelligence, now is the time to act!



Four factors have changed in recent years, allowing use of AI and ML in business

Data availability
Massive growth of data available

Free software
Open source simplifies implementation

Faster hardware
Technical development enable new applications

Availability of services
Digital providers offer partial AI solutions already

Reality » **Long-term research** » **Science Fiction**

"Weak AI"
Assistance or acquisition
of specific tasks
with individual solutions

"General AI"
Knowledge transfer
from single solutions to
larger topics

"Super AI"
Machines are able to **meet people spiritually**

Application of AI and ML are coming out from research into practice.

Source: AI@Porsche project team * According to a typical trajectory for the introduction and adoption of new technologies.

Motivating the research AI procurement vs sales / marketing

In McKinsey's and Deloitte "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. In fact, some expect that procurement is less likely to benefit from the application of AI methods 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?

Research question: Why is procurement lagging behind in AI and ML adoption versus the sales function?

Recent AI applications are mainly focusing on manufacturing, logistics and transportation

Literature and practice suggests that procurement is also lagging in big data analytics

Few contributions steer towards procurement

AI / ML

Application of AI and ML are coming out from research into practice.

Sources: Chae et al., 2014, Hazen et al., 2014, Nowosel et al., 2015, Maltaverne and Dieringer, 2017, Moretto et al., 2017, Nguyen et al., 2018, Handfield et al., 2019, Ammanath et al., 2020, Balakrishnan et al., 2020.

Analysis of potential root causes for further analysis

In the sales function, 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. Pioneering organizations show a lead increase, cost reduction, and call time reduction

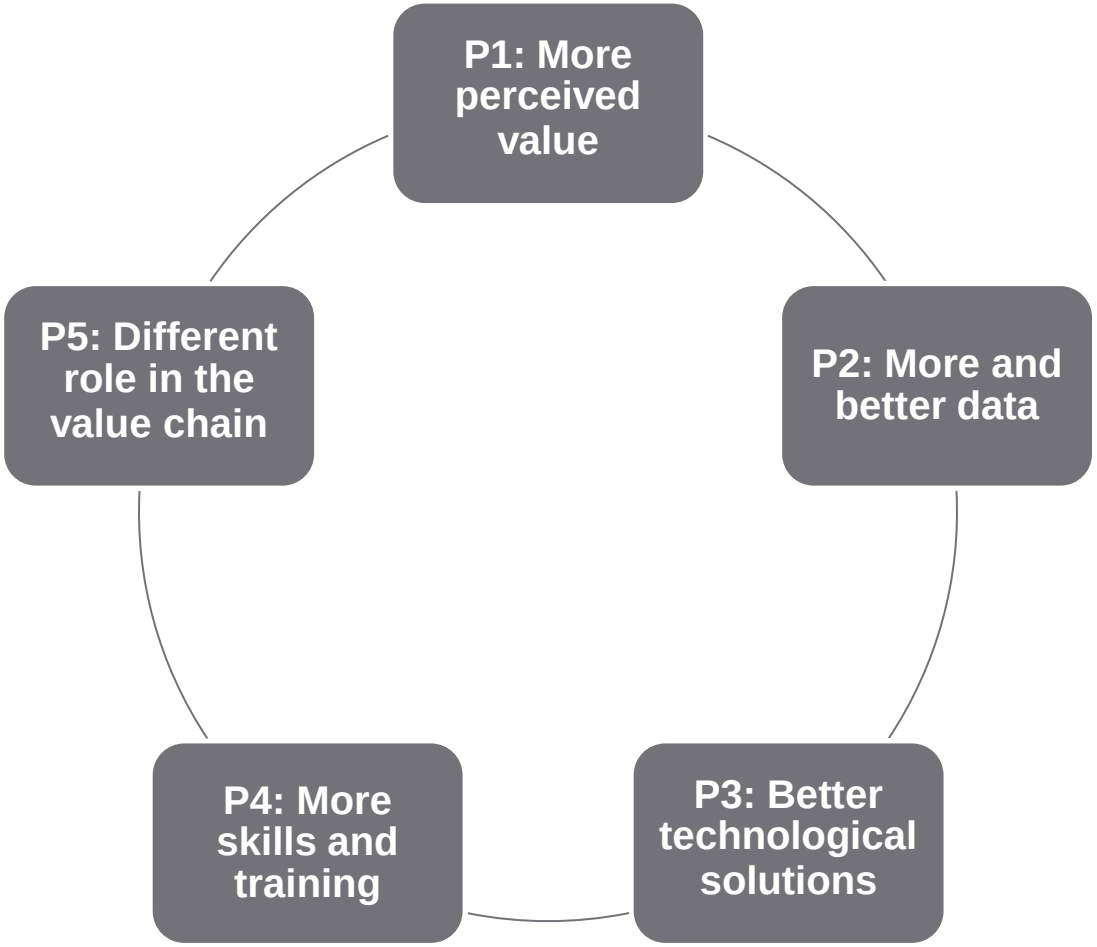
Dimension	Procurement		Sales / Marketing	
	Decisions	Data	Decisions	Data
Strategic	Supplier network	Overall costs and quality	Value proposition	Overall profits and revenue
Tactical	Supplier selection	Achieved savings	Project bidding	Achieved projects
Operational	Supplier evaluation	Performance measurement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

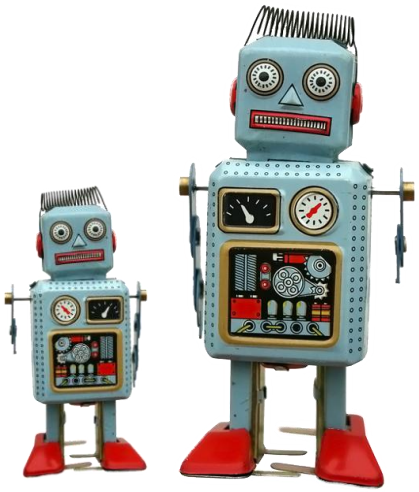
Five propositions have been derived by contrasting and comparing the needed decisions and available data in a master thesis at the University of Mannheim and during discussions at the 2021 European Research Seminar to facilitate practical application and direct further research. There are myriad research opportunities from purchasing-marketing interface to self-perception and maturity frameworks

Five prepositions have been derived for further discussion.

Sources: Souza, 2014, van Weele,, 2014, Baumgartner et al., 2016, Batran et al., 2017, Antonio, 2018, BME, 2018, Chopra, 2019, Inverto, 2020, Spreitzenbarth et al., 2021a, Zhong, 2021.

Derived propositions why procurement might be lagging

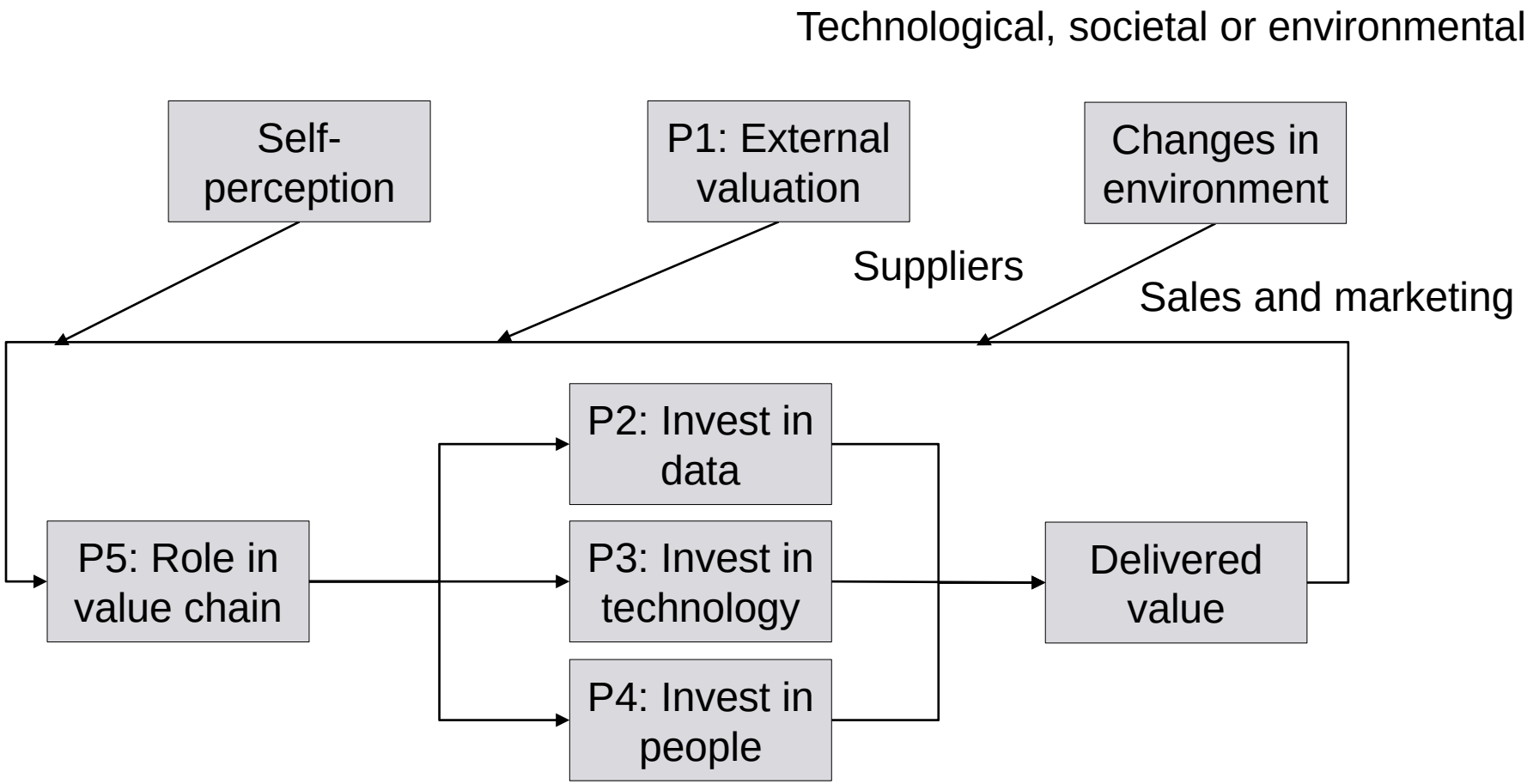




Interesting area for more research on the purchasing-marketing interface.

Source: Spreitzenbarth et al., 2021a.

Logical interlink between prepositions and the environment



Now, how can we break out of this cycle?

Recommendations developed from the propositions

I. **More perceived value**: Consider closely the value that procurement delivers to the organization when evaluating where to invest in data, technology, and skill

II. **More and better data**: Gather data with a consistent strategy aligned with the overall strategy where especially data sharing within the value chain is a way to obtain better information

III. **Better technological solutions**: 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

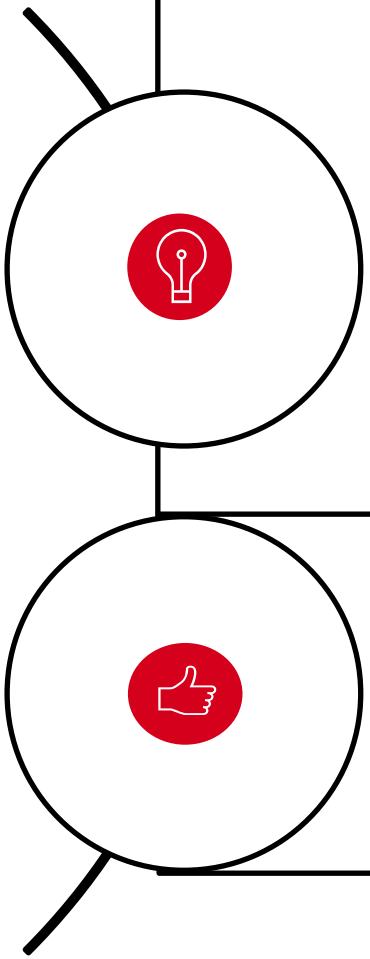
IV. **More skills and training**: Set up organizational structures and processes to effectively combine human skills and artificial intelligence for maximum efficiency with human-AI collaboration

V. **Different role in the value chain**: Develop the skills, technology, and data in procurement functions to provide more value to the organization

Now is the time to act!

Source: Spreitzenbarth et al., 2021a.

Opening up the presentation for discussion



Questions for discussion

- What are reasons procurements does not adopt AI and BDA as quickly as other functions? Is that good or bad or does it even matter after all? Which theoretical framework could work well to structure possible root causes?
- Which specific aspects from sales and marketing organizations should be further considered in the study?
- What do you think could procurement organizations do in order to increase their analytical maturity and performance?

Contribution

- Derived propositions with recommendations based on concrete applications from established providers and start ups
- Managerial advice and research direction for the supply function of how to speed up in the analytics race to achieve higher levels of analytical maturity and performance

Looking forward to an interesting discussion with you!

Thanks for your time! The references are summarized below.

ACM. (2012). ACM Computing Classification System. Retrieved from: https://dl.acm.org/ccs (accessed September 12th, 2021).
Ammanath, B., Jarvis, D., Hupfer, S. (2020). Thriving in the era of pervasive AI: Deloitte's State of AI in the Enterprise. 3. Deloitte. Retrieved from: https://www2.deloitte.com/us/en/insights/focus/cognitive-technologies/state-of-ai-and-intelligent-automation-in-business-survey.html (accessed September 11th, 2021).
Allal-Chérif, O., Simón-Moya, V., Carlos Cuenca Ballester, A.C.C. (2021). Intelligent purchasing: How artificial intelligence can redefine the purchasing function. Journal of Business Research. 124, 69-76. ISSN 0148-2963, 10.1016/j.jbusres.2020.11.050.
APICS (2017). Retrieved from: http://www.apics.org/docs/default-source/scor-training/scor-v12-0-framework-introduction.pdf?sfvrsn=2 (accessed September 12th, 2021).
Antonio, V. (2018). How AI Is Changing Sales. Harvard Business Review. Retrieved from: https://hbr.org/2018/07/how-ai-is-changing-sales (accessed September 12th, 2021).
Balakrishnan, T., Chui, M. Hall, B., Henke, N. (2020). The state of AI in 2020. Retrieved from: https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/global-survey-the-state-of-ai-in-2020 (accessed September 12th, 2021).
Batran, A., Erben, A., Schulz, R., Sperl, F. (2017). Procurement 4.0: A survival guide in a digital, disruptive world. Campus Verlag. ISBN 978-3593506692.
Baumgartner, T., Hatami, H., Ark, J.V., Valdivieso de Uster, M., Benioff, M. (2012). Sales Growth: Five Proven Strategies from the World's Sales Leaders. McKinsey & Company. Wiley. 2. ISBN 978-1119281085.
BME. (2018). Digitization of source-to-contract. In collaboration with h&z. Retrieved from: https://www.bme.de/fileadmin/user_upload/180426_BME_FDL_Vortrag_S2C_Digitization_Handout_huz.pdf (accessed September 12th, 2021).
Brintrup, A.M. (2021). AI in the Supply Chain: a classification framework and critical analysis of current state. Oxford Handbook of Supply Chain Management. 10.1093/oxfordhb/9780190066727.013.24.
Chae, B., Olson, D., Sheu, C. (2014). The impact of Supply Chain Analytics on Operational Performance: A Resource-Based View. International Journal of Production Research. 52 (16), 695-710. 10.1080/00207543.2013.861616.
Chopra, A. (2019). AI in Supply & Procurement. Amity International Conference on Artificial Intelligence. 308-316. 10.1109/AICAI.2019.8701357.
Davenport, T.H. (2018). The AI advantage: how to put the artificial intelligence revolution to work. MIT Press. ISBN 978-0262538008.
Eisenhardt, K. (1989). Building Theories from Case Study Research. The Academy of Management Review, 14 (4), 532-550. 10.2307/258557.
Gartner. (2018). Analytics. Retrieved from: https://www.gartner.com/it-glossary/analytics (accessed September 12th, 2021).
Guida, M., Caniato, F., Moretto, A. (2021). The impact of artificial intelligence on the procurement process. International Purchasing and Supply Education and Research Association Conference. 30.
Gunasekaran, A., Papadopoulos, T., Dubey, R., Wamba, S.F., Childe, S.J., Hazen, Akter, B.S. (2017). Big data and predictive analytics for supply chain and organizational performance. Journal of Business Research. 70, 308-317. ISSN 0148-2963, 10.1016/j.jbusres.2016.08.004.
Handfield, R., Jeong, S., Choi, T. (2019). Emerging procurement technology: data analytics and cognitive analytics. International Journal of Physical Distribution and Logistics Management. 49 (10), 972-1002. 10.1108/IJPDLM-11-2017-0348.
Hazen, B.T., Boone, C.A., Ezell, J.D., Jones-Farmer, L.A. (2014). Data quality for data science, predictive analytics, and big data in supply chain management. International Journal of Production Economics. 154 (C), 72-80. 10.1016/j.ijpe.2014.04.018.
Henke, M., Schulte, T., Richard, J. (2016). Pilot Study Procurement 4.0. Fraunhofer Institute for Material Flow and Logistics and the German Association for Materials Management, Purchasing and Logistics. Retrieved from: https://www.iml.fraunhofer.de/content/dam/iml/de/documents/OE260/Pilot%20Study_Procurement%204-0_Fraunhofer%20IML_BME.pdf (accessed September 12th, 2021).
Inverto. (2020). Strategic Procurement Training. Retrieved from: https://www.inverto.com/en/service/procurement-trainings/strategic-procurement-training (accessed September 20th, 2021).
Kok, J.N., Boers, E.J., Kosters, W. A., van der Putten, P., Poel, M. (2009). Artificial intelligence: definition, trends, techniques, and cases. Artificial intelligence. 1.
Król, K. and Zdonek, D. (2020). Analytics Maturity Models: An Overview. Information. 11 (3), 142. 10.3390/info11030142.
Kraljic, P. (1983). Purchasing Must Become Supply Management. Harvard Business Review.
Maltaverne, B. and Dieringer, T. (2017). Digital Procurement: Just Hype or the New Standard? Jaggaer in cooperation with Austrian Bundesverband Materialwirtschaft, Einkauf und Logistik BMÖ. Retrieved from: https://www.jaggaer.com/resource/digital-procurement-study (accessed September 12th, 2021)
Mayring, P. (2014). Qualitative content analysis - theoretical foundation, basic procedures and software solution. Retrieved from: https://www.ssoar.info/ssoar/handle/document/39517 (accessed September 12th, 2021).
Min, H. (2010). Artificial intelligence in supply chain management: Theory and applications. International Journal of Logistics Research and Applications. 13 (1), 13-39. 10.1080/13675560902736537.
Moretto, A: Ronchi, S., Patrucco, A.S. (2017). Increasing the effectiveness of procurement decisions: The value of big data in the procurement process. International Journal of RF Technologies. 8, 79-103. 10.3233/RFT-171670.
Nguyen, T., Zhou, L., Spiegler, V., Leromonachou, P., Lin, Y. (2017). Big data analytics in supply chain management: A state-of-the-art literature review. Computers and Operations Research. 98, 254-264. ISSN 0305-0548, 10.1016/j.cor.2017.07.004.
Nowosel, K., Terrill, A., Timmermans, K. (2015). Procurement's Next Frontier: Accenture Strategy. Retrieved from: https://www.accenture.com/_acnmedia/pdf-52/accenture-digital-procurement-next-frontier.pdf (accessed September 12th, 2021)
Russell, S. and Norvig, P. (2020). Artificial Intelligence: A modern approach. Prentice Hall. 4. ISBN 978-0134610993.
Sanders, N. R. (2016). How to use big data to drive your supply chain. California Management Review. 58 (3), 26-48. 10.1525/cmr.2016.58.3.26.
Schoenherr, T. and Speier-Pero, C. (2015). Data science, predictive analytics, and Big Data in supply chain management: Current state and future potential. Journal of Business Logistic. 36 (1), 120-132. 0.1111/jbl.12082.
Schulze-Horn, I., Hueren, S., Scheffler, P., Schiele, H. (2020). Artificial Intelligence in Purchasing: Facilitating Mechanism Design-based Negotiations. Applied Artificial Intelligence. 34 (8), 618-642. 10.1080/08839514.2020.1749337.
Spina, G, Caniato, F., Luzzini, D., Ronchi, S. (2013). Past, present and future trends of purchasing and supply management: An extensive literature review. Industrial Marketing Management. 42 (8), 1202-1212. ISSN 0019-8501, 10.1016/j.indmarman.2013.04.001.
Souza, G.C. (2014). Supply chain analytics. Business Horizons. 57 (5), 595-605. ISSN 0007-6813, 10.1016/j.bushor.2014.06.004.
Spreitzenbarth, J.M., Stuckenschmidt, H., Bode, C. (2021a). The State of AI: Procurement vs Sales. CSCMP European Research Seminar on Logistics and SCM. 16.
Spreitzenbarth, J.M., Stuckenschmidt, H., Bode, C. (2021b). Methods of artificial intelligence in procurement: A literature review. International Purchasing and Supply Education and Research Association Conference. 30 (1). ISSN 2772-4379.
Waller, M. and Fawcett, S. (2013). Data Science, Predictive Analytics, and Big Data: A Revolution That Will Transform Supply Chain Design and Management. Journal of Business Logistics. 34 (2), 77-84. 10.1111/jbl.12010.
Van Weele, A.J. (2014). Purchasing and Supply Chain Management. 6. ISBN 9781408088463.
Vollmer, M., Brimm, R., Eberhard, M. (2018). Procurement 2025: An SAP Perspective. Retrieved from: https://www.sap.com/documents/2018/11/e49dca39-297d-0010-87a3-c30de2ffd8ff.html (accessed September 12th, 2021).
Zagorin, E. (2019). Cognitive Procurement - Where it Will (and Will Not) Impact the Enterprise. Retrieved from: https://emerj.com/ai-sector-overviews/cognitive-procurement-enterprise (accessed September 12th, 2021).
Zhong, Z. (2021). The AI Battle: Procurement vs. Sales. University of Mannheim. Thesis.

Contact details: Jan.spreitzenbarth@porsche.de LinkedIn ResearchGate ORCID [0000-0002-8282-047X] Link to YouTube ERS conference teaser video: https://youtu.be/azb0GoCiMNk