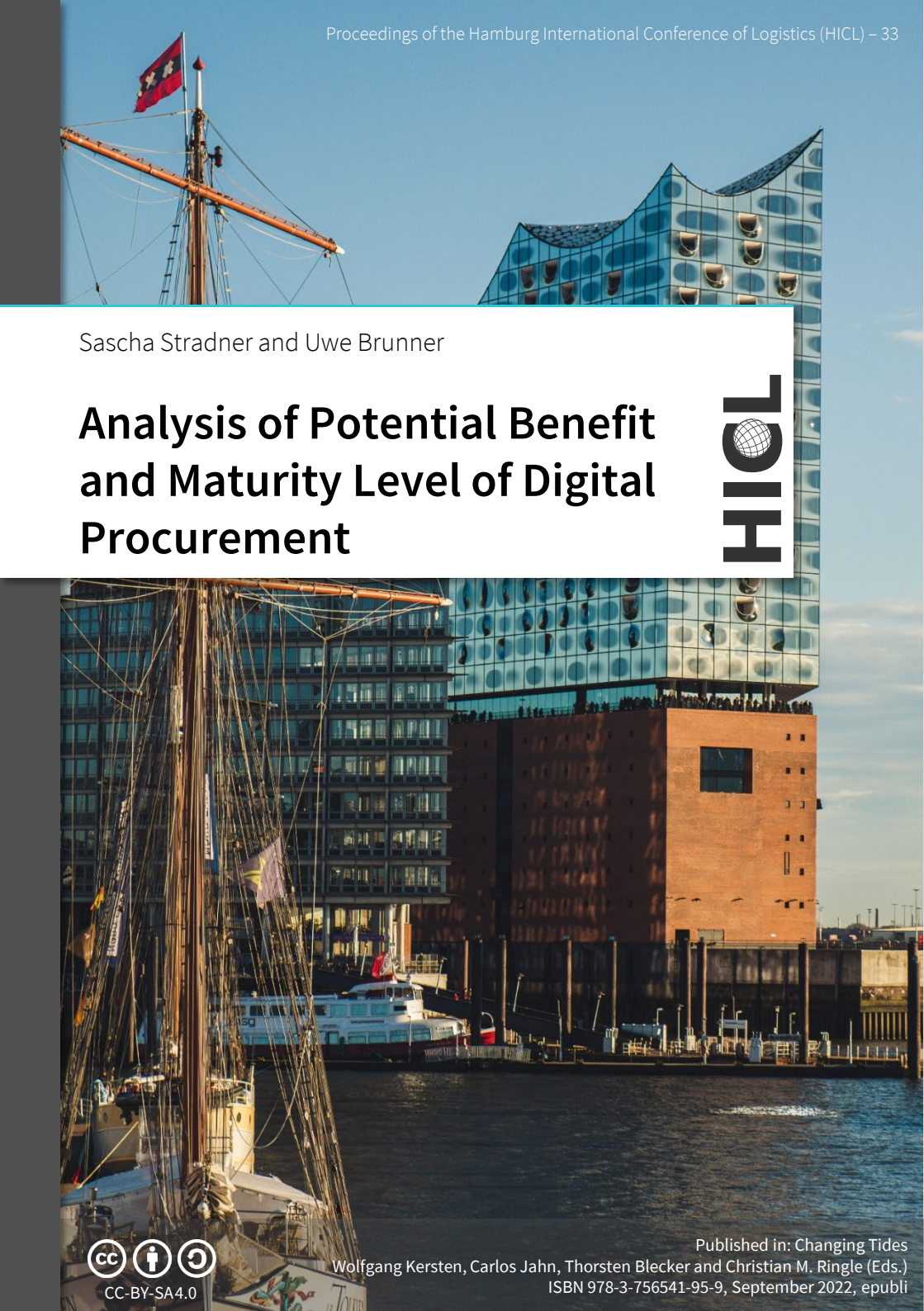

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Analysis of Potential Benefit and Maturity Level of Digital Procurement

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Analysis of Potential Benefit and Maturity Level of Digital Procurement

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Purpose: *Procurement departments are facing major challenges of digitalization. To meet future business requirements, managers are forced to arrange investments for the digitalization of procurement processes. Current studies show that the maturity level of procurement digitalization is still lacking due to missing benefit assessments of investments.*

Methodology: *For this purpose, the benefit potentials of digitalized procurement are analyzed based on a systematic literature analysis, followed by qualitative expert interviews to evaluate hypotheses derived from the literature. Moreover, the expert interviews provide information about the current maturity level of digitalization in procurement.*

Findings: *The systematic literature analysis and qualitative expert interviews provide 24 potential benefits, which are summarized in six categories. The expert interviews indicate that increasing of efficiency, process transparency and data quality are seen as the main benefit potentials of digital procurement. In terms of maturity, the experts confirm potentials that need to be exploited to enable future procurement at competitive prices.*

Originality: *Current research on digital procurement is forcing superficial concepts of digitalization measures. A well-founded assessment of potential benefits of the implementation in companies is still missing, which leads to critical barriers in digitalization and missing adaption to rapidly changing market conditions.*

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1 Introduction

Procurement departments are facing many challenges, in particular high process costs due to repetitive activities, long lead times due to complicated approval process across several hierarchical levels and lack of transparency in procurement controlling. In a market economy shaped by globalization and increasing pressure in international competition, the demand for companies to push lean and efficient processes is becoming greater. (Kollmann, 2019)

The digitalization of purchasing processes offers various potentials and is seen as very promising for long-term success. Especially in a VUCA world (Mack et al. 2016), which is a world characterized by *Volatility*, *Uncertainty*, *Complexity* and *Ambiguity*, benefits of digitalization could help to handle supply risks caused by unpredictable events like international conflicts or pandemics.

Nevertheless, the degree of implementation in small and medium-sized companies (SME) is less mature. A survey conducted by BME (2021) in collaboration with ONVENTIS and the ESB BUSINESS SCHOOL among German SME and large mid-sized companies concluded that the maturity level of digitalization in purchasing is still insufficient. There is no discernable trend of an upturn, as the results have hardly changed compared to the same survey of the previous year. The core message is that smaller companies make regression in automation of operative processes, in general the main potential is seen in supplier management due to the implementation of sustainability goals.

Therefore, the objective of this research paper is to find out which barriers inhibit companies' digitalization, although digitalization promises many potential benefits in purchasing. To conduct this research, it is necessary to deal with the topic of digitalized procurement first. *Digitalization*, *Digital Transformation,* or *Industry 4.0* have a huge impact on industrial production processes. It is obvious that traditional procurement will be also influenced by the technological development in future. Another survey shows that the targeted application of technology in procurement helps to save 20 % of staff and 30 % of process costs in best-in-class companies. (Deloitte 2021a)

A further survey of DELOITTE (2021b) asked 400 Chief Procurement Officers (CPOs) in 40 countries about their top priorities. While in 2019 digital transformation was mentioned by 63 % of the participants, in 2021 digital transformation was voted as top-3 priority with 76 % beside cost reduction (76 %) and driving operational efficiency (78 %).

Digital procurement itself is defined as a concept to create a holistic digital transformation of purchasing departments. The term is defined by many authors and shows substantial differences in selected instruments and technologies. The following Table 1 helps to identify the most common technologies mentioned in the context of digital procurement. The literature used for the comparison is part of the screening process in Section 2.1. Beside the potential benefits, they also mention relevant technologies in digitalized procurement.

Table 1: Technologies in Digital Procurement

Authors	**Big Data**	**Cloud Computing**	**Digital Reporting**	**IoT**	**AI**	**Mobile Devices**	**Self Service**	**Social Media**
Bienhaus/Haddud (2018)	X			X	X			
Kleemann/Glas (2017)	X	X		X	X			
Nicoletti (2018)	X	X		X		X		
Reinhardt (2020)	X	X		X	X	X		X
Sendler (2016)	X	X			X			
Tschandl et. al (2016)	X	X	X			X	X	X
Number of mentions	**6**	**5**	**1**	**4**	**4**	**3**	**1**	**2**

Big Data, *Cloud Computing* as well as *Internet of Things (IoT)* and *Artificial Intelligence (AI)* are seen as the main technologies for digital procurement. The analyzed literature sources are an essential element of the research design described in the following section of this research paper.

2 Research Design

The following section describes the research design including the general research process and provides an overview of both research steps and phases. A detailed description of the individual elements follows in section 2.2.

2.1 Research Procedure

Since this research paper deals with answering two research questions, (a) *"Which potential benefits of implementing digitalized procurement are observed by the scientific literature?"* and (b) *"Which potential benefits do procurement managers see in digitalized procurement and how do they evaluate their maturity of digitalized procurement?"*, the methodology is divided into two steps, each consisting of three phases (P).

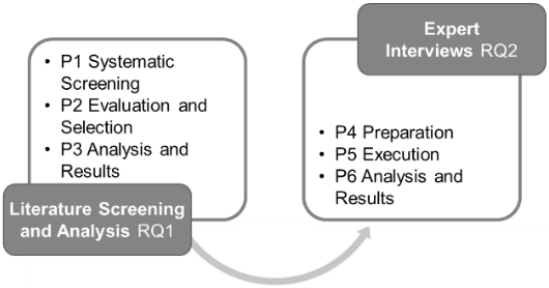

Figure 1: Overall Research Procedure

As shown in Figure 1, two different methods are used to address the two research questions. The first research question (RQ1) is answered by means of a systematic literature screening and analysis. Based on these results, the second research question (RQ2) is investigated through expert interviews, which also requires three phases. The following subsections describe the respective research methods.

2.1.1 Systematic Literature Analysis

To answer the first research question, a comprehensive literature analysis is conducted. Phase 1 starts with the definition of the research question. After that, the databases are determined, which are used for the literature screening. In the next phase the key words are defined, which are used to search for topic-related literature sources in selected databases. After all, parameters must be defined, the last step of this phase is the execution of the systematic screening.

In the second phase, the screened literature is evaluated and ranked according to the relevance for the research question. For this purpose, evaluation criteria are defined. These are presented in an evaluation matrix to ensure objectivity. For the evaluation, the criteria are weighted, and the selected sources are evaluated with a scoring model. The last phase includes the analysis of the selected literature sources to identify the most common potential benefits of digitalized procurement. For this purpose, a content analysis of the research papers is carried out and the results are summarized. The research procedure is shown in Figure 2. The research design is based on different methods of literature (Seuring/Gold 2012) (Hochrein et al. 2015) which are explaining the process of systematic literature reviews, especially for tertiary studies. Since this paper is concentrating on primary studies on the specific topic of digitalization benefits in procurement, the research design is accordingly adapted.

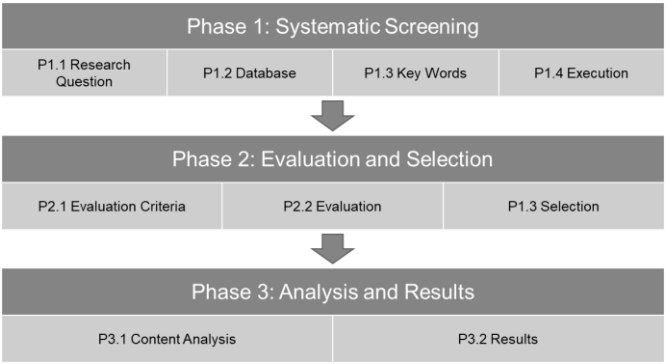

Figure 2: Detailed Research Procedure of Step 1

2.1.2 Expert Interviews

The second step of the research is about the enrichment of the derived results of Step 1 with more practical expert input. Therefore, expert interviews were prepared, and the results analyzed. The target is to find out which potential benefits Austrian industry procurement managers identified. Moreover, they give an insight into the current maturity level of digitalization in the respective procurement department. The interview guide consists of four thematic blocks: (1) *company-specific information* (2) individual *understanding of digitalized procurement and its technologies* (3) *potential benefits of digitalized procurement applications* and (4) *maturity level of digitalized procurement in Austrian industry*. The sampling procedure follows several limitations to ensure well-founded expert interviews, whereby the sample is limited on 4 procurement managers. In a further research step, the number of conducted interviews could be increased or expanded to a quantitative survey by convert the existing interview guide for large-scaled research. The procurement managers are employed in medium-sized companies which are allocated to the manufacturing industry in Austria by using the national classification ÖNACE which is based on the European NACE (Nomenclature européenne des activités économiques) classification. The advantage of ÖNACE is seen in the additional sublevels of the classification, which is not given in NACE. Therefore, a more detailed classification of economical activities is possible. To analyze the expert interviews, a qualitative content analysis is conducted to ensure a qualitative text interpretation (Mayring 2002).

3 Research Execution

After defining the general procedure of the research, the following section shows the execution of the research. The sources identified in this way are evaluated based on predefined criteria, allowing the most suitable literature sources to be selected. These are analyzed in the final phase and provide the potential benefits of digitalized procurement as a result, with which the first research question can be answered.

3.1 Execution of Systematic Literature Screening

After the definition of the research question, the next step is to define which database will be used for the literature screening. For this purpose, three databases were selected for the research since they have a high scientific standard and are assigned to the field of economics.

1. EBSCO
2. Emerald Insights
3. WISO

Furthermore, *Google Scholar* is also used for the research, as it allows further scientific documents to be found that do not appear in three databases mentioned above. After a first general screening about *Digital Procurement* following terms are identified and displayed in the Table 2:

Table 2: Key Words for Literature Screening of Digital Procurement

Key Words (English/German)		
Procurement 4.0 *Beschaffung 4.0*	Purchasing 4.0 *Einkauf 4.0*	Supply Management 4.0 *Supply-Management 4.0*
Supply Chain 4.0 *Supply-Chain 4.0*	Digital Procurement *Digitale Beschaffung*	Digital Purchasing *Digitaler Einkauf*
in combination with … (AND statement)		
Digitalization *Digitalisierung*	Digitalisation -	Digitization -
Digitisation -	Digital Transformation *Digitale Transformation*	Industry 4.0 *Industrie 4.0*

The search terms that fall within the scope of digitalized procurement are now used in a first search run. To ensure the highest possible coverage, the terms above are searched firstly and then in combination with the terms of digitalization.

The second part is to analyze which literature is about potential benefits for digital procurement. For this purpose, synonyms were defined and shown in Table 3.

Table 3: Key Words for Literature Screening of Potential Benefits

Key Words (English/German)		
Potential *Nutzenpotential*	Benefit *Nutzenpotenzial*	Profit *Nutzen*
Return *Potential/Potenzial*	Chance *Chance*	Improvement *Verbesserung*
Expectation *Erwartung*	Advantage *Vorteil*	Goal/Target *Ziel*
Opportunities *Möglichkeiten*		

The first search run offered approximately 11.000 hits. Therefore, the search run is limited on title and abstract. This measure offers 575 hits released since 2015. After deleting duplicates and research papers without full text available, the amount of research papers is decreased to 53. For the second search run, the sources identified in the first search run are now searched for terms from the area of potential benefits. Thus, only those research papers that deal with both digitalized procurement and its potential benefits will be further considered.

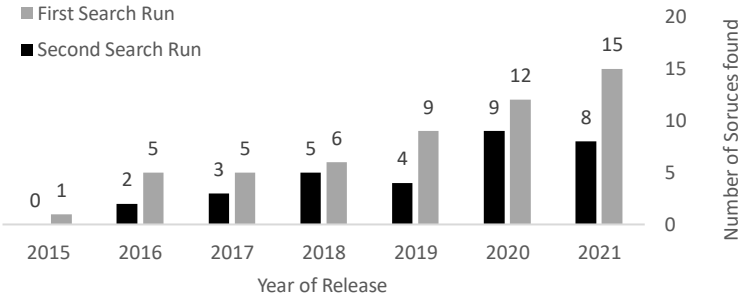

Figure 3: Distribution based on Year of Release after the first search run

As depicted in Figure 3, 53 sources are identified in the first run. The second run offers 31 research papers (8 in German and 23 in English language) which are evaluated using the criteria defined in Table 4.

Table 4: Evaluation Criteria

	Points				
Criteria	**1**	**2**	**3**	**4**	**5**
a) Actuality	2012 or older	2013-2014	2015-2016	2017-2018	2019 - 2021
b) Information content toward Procurement 4.0	rarely addressed	less addressed	mid addressed	highly addressed	main focus
c) Information content toward potential benefits	rarely addressed	less addressed	mid addressed	highly addressed	main focus
d) Procurement-specific or supply-chain (SC)-specific	mainly on SC	mainly on SC, hardly on procurement	balanced focus	Mainly on procurement, hardly on SC	mainly on procurement

After defining the evaluation criteria and the scale, the screened literature is evaluated. Table 5 shows the final rating of the literature.

Table 5: Evaluation of screened literature based on the defined criteria

	Author	a) 35 %		b) 30 %		c) 30 %		d) 5 %		Evaluation	
1	BME et al. (2020)	5	**1,75**	5	**1,50**	4	**1,20**	5	**0,25**	4,70	
2	Bienhaus/ Haddud (2018)	4	**1,40**	5	**1,50**	5	**1,50**	5	**0,25**	4,65	
3	Globality (2019)	5	**1,75**	4	**1,20**	5	**1,50**	4	**0,20**	4,65	
4	Bag et al. (2021)	5	**1,75**	5	**1,50**	3	**0,90**	5	**0,25**	4,40	
5	Bag et al. (2020)	5	**1,75**	5	**1,50**	3	**0,90**	5	**0,25**	4,40	
6	Högel et al. (2018)	4	**1,40**	5	**1,50**	4	**1,20**	5	**0,25**	4,35	
7	Jerome et al. (2021)	5	**1,75**	5	**1,50**	3	**0,90**	4	**0,20**	4,35	
8	Nicoletti (2018)	4	**1,40**	5	**1,50**	4	**1,20**	5	**0,25**	4,35	
9	Radell/ Schannon (2019)	5	**1,75**	4	**1,20**	4	**1,20**	4	**0,20**	4,35	
10	Glas/ Kleemann (2016)	3	**1,05**	5	**1,50**	5	**1,50**	5	**0,25**	4,30	
11	Hallikas et al. (2021)	5	**1,75**	4	**1,20**	4	**1,20**	3	**0,15**	4,30	

	Author	a) 35 %		b) 30 %		c) 30 %		d) 5 %		Evaluation	
12	Efficio (2018)	4	**1,40**	5	**1,50**	3	**0,90**	5	**0,25**	4,05	
13	Tripathi/ Gupta (2021)	5	**1,75**	4	**1,20**	3	**0,90**	4	**0,20**	4,05	
14	Schlünsen/ Schentler (2016)	3	**1,05**	5	**1,50**	4	**1,20**	5	**0,25**	4,00	
15	Von Eiff (2018)	4	**1,40**	4	**1,20**	4	**1,20**	4	**0,20**	4,00	
16	Haddud/ Khare (2020)	5	**1,75**	2	**0,60**	5	**1,50**	2	**0,10**	3,95	
17	Haddud et al. (2017)	4	**1,40**	3	**0,90**	5	**1,50**	2	**0,10**	3,90	
18	Gottge et al. (2020)	5	**1,75**	4	**1,20**	2	**0,60**	5	**0,25**	3,80	
19	Sánchez-Rodríguez (2020)	5	**1,75**	2	**0,60**	4	**1,20**	5	**0,25**	3,80	
20	Muñoz-Garcia/ Vila (2019)	5	**1,75**	3	**0,90**	3	**0,90**	4	**0,20**	3,75	
21	Pattanayak/ Punyatoya (2020)	5	**1,75**	2	**0,60**	4	**1,20**	4	**0,20**	3,75	

	Author	a) 35 %		b) 30 %		c) 30 %		d) 5 %		Evaluation	
22	Müller/ Bollini (2017)	4	**1,40**	2	**0,60**	5	**1,50**	4	**0,20**	3,70	
23	Zekhnini et al. (2021)	5	**1,75**	3	**0,90**	3	**0,90**	2	**0,10**	3,65	
24	Kleemann/ Glas (2017)	4	**1,40**	5	**1,50**	1	**0,30**	5	**0,25**	3,45	
25	Chauhan/ Singh (2020)	5	**1,75**	2	**0,60**	3	**0,90**	1	**0,05**	3,30	
26	Koh et al. (2019)	5	**1,75**	2	**0,60**	3	**0,90**	1	**0,05**	3,30	
27	Patrucco et al. (2020)	5	**1,75**	2	**0,60**	3	**0,90**	1	**0,05**	3,30	
28	Becker/ Röper (2021)	5	**1,75**	1	**0,30**	3	**0,90**	4	**0,20**	3,15	
29	Yevu/Yu (2020)	5	**1,75**	2	**0,60**	2	**0,60**	4	**0,20**	3,15	
30	Meitinger (2021)	5	**1,75**	3	**0,90**	1	**0,30**	3	**0,15**	3,10	
31	Mastos et al. (2021)	5	**1,75**	1	**0,30**	3	**0,90**	1	**0,05**	3,00	

3.2 Content Analysis and Results

To focus on the most relevant literature in the content analysis, literature with a rating greater or equal than 4 are selected. This cut-off is based on the fact, that following publications are evaluated at least once with a score of "2". This measure is needed to ensure high quality in literature selection based on the defined criteria above. At the end 15 sources meet this criterion and are analysed in detail regarding benefits of digitalized procurement. The most important outcomes are described in this section.

Bag et al. (2021) and Bag et al. (2020) refer to increased profit margins and productivity, 30 to 50 % reduction of transaction costs, shortening of delivery times, higher flexibility, and transparency due to data availability. Moreover Bienhaus/Haddud (2018) identified potentials in profitability, shortening of lead times and better transparency and decision-making.

Different studies of BME (2020) and EFFICIO (2018) show significant potentials of digitalized procurement. While BME identified optimization in process costs and an increase of transparency and supply reliability, EFFICIO predict doubling of operational process effectivity by digital solutions. This increase is caused by high and sustained cost reductions, improved decision-making, and risk-reduction along the supply chain.

Glas/Kleemann (2016) expect a cost reduction by digitalized procurement of 7.5 up to 40 %. Högel et al (2021) estimate cost reduction by 5 to 10 %. Beside a reduced coordination effort, product and process quality could be improved and stock levels optimized. Hallikas et al. (2021) defined high transparency and efficiency, shortening of lead times and minimization of supply risks as the highest benefits of digitalized procurement. Concerning lead times, Högel et al (2021) estimate a reduction from 10 to 3 days. Moreover, Nicoletti (2018) defines process costs as potential benefit of digitalized procurement. Furthermore, Jerome et al. (2021) also mentioned a high level of customer satisfaction, reduction of insecurities and improvement of supplier management processes especially in supplier scouting and onboarding. Radell/Schannon (2019) and Tripathi/Gupta (2021) see potentials through real-time data availability and increase of innovation level. Digital technologies in procurement offer new competitive advantages through velocity and quality of data.

In the following step, the results of the qualitative analysis are clustered and assigned to six categories. The main category is defined as *"costs/earnings"*, the other categories are *"time"*, *"quality"*, *"risk"*, *"efficiency/effectivity"* as well as *"others"*. 24 benefits could be identified as depicted in the following Table 6.

Table 6: Frequency Analysis of Potential Benefits in Literature

Potential benefits	**Frequency**	**Share [%]**
Costs/Earnings	23	**21,5**
Decrease Purchase Costs	11	
Decrease Process Costs	5	
Increase Productivity	4	
Improve Profitability/Margins	2	
Reduce Quality Costs	1	
Time	20	**18,7**
Reduce lead and transaction time	15	
Shortening delivery times	2	
Increase time for strategic issues	2	
Reduction of coordination effort	1	
Quality	29	**27,5**
Increase Transparency/Data Quality and Availability	15	
Improve decision quality	7	

Potential benefits	Frequency	Share [%]
Improve product and process quality	4	
Increase customer satisfaction	2	
Improve integration with LOB/divisions	1	
Risk	10	**9,3**
Minimize purchase risks	7	
Increase security of supply	2	
Improve risk evaluation of suppliers	1	
Efficiency/Effectivity	14	**13,1**
Increase Efficiency/Effectivity in general	11	
Increase level of automation	2	
Reduce Waste	1	
Others	11	**10,3**
Increase Flexibility/Agility	4	
Deny Maverick Buying	2	
Increase level of innovation	2	
Improve stock levels	2	
Improve supplier scouting and onboarding	1	
Number of Mentions	**107**	**100 %**

3.3 Potential Benefits in Practice

The second step of the research is about the enrichment of the results of step 1 with more practical expert input. This part of the research offers a first insight into the practical benefits from the industry's point of view. After a roll out of the expert interviews and transformation into a survey, the current interview guide can be used for a quantitative analysis on the topic in a further step.

The experts were asked about their opinion about which technologies are relevant for digitalized procurement. The outcome of this question shows a heterogeneous picture, as just *Big Data* and *Artificial Intelligence* are mentioned of the technologies of the introduction. Talking about technologies, *e-Procurement*, *ERP-systems*, *supplier portals*, *SRM-systems* and *advanced reporting tools* are mentioned by the experts as the key applications for digitalized procurement. *Cloud Computing* and *Internet of Things* are not mentioned in that context. In a next step, they evaluated the technologies mentioned in the previous question on the relevance using the following rating scale:

- 1 … highly relevant
- 2 … rather relevant
- 3 … rather not relevant
- 4 … not relevant

Table 7 shows the result of the evaluation, summarized into the categories

Table 7: Evaluation of technologies mentioned by the experts (A to D)

Ranking	**Technology**	**Classification**
1	ERP-systems	Highly relevant
2	Artificial Intelligence	

Ranking	Technology	Classification
3	Robotic Process Automation	Very relevant
4	Big Data	
5	Power BI	
6	Supplier Portals	Relevant
7	Advanced Reporting Tools	
8	SRM-systems/e-Procurement	Rather not relevant

Except for *SRM-system/e-Procurement*, experts evaluated the technologies with highly or rather relevant. A possible explanation for the evaluation of *SRM-system/e-Procurement* could be the fact that it is seen as a development step of IT employment to digitalized procurement. Glas/Kleemann (2017) describe this development, starting with *MRP (Material Requirement Planning)* to ERP (Enterprise Resource Planning), over *eProcurement* to *Procurement 4.0* with increasing operative relief and strategic influence from step to step. Therefore, ERP-systems as well as SRM-systems and e-Procurement offer the basis for digitalized procurement. Otherwise, ERP-systems are classified as very relevant technology and is seen as a minimum requirement for efficient collaboration and processes within an organization.

Especially *Robotic Process Automation* in combination with *Big Data* and *Artificial Intelligence* to automate operational purchasing processes like purchase orders or master data management are seen as the core technologies. This estimate is congruent with literature. (Nicoletti 2018) (Tripathi/Gupta 2020) (Bag et al. 2021)

In the next step open questions about the estimation of potential benefits of digitalized procurement are asked to the experts. The results were analyzed by assignment to the categories of Section 3.2. Additionally, experts were asked to evaluate the benefits of the

literature based on the scale of Section 3.3, whereby the evaluation is done for benefit categories *Time*, *Quality*, *Risk*, *Efficiency/Effectivity* and *Others*. The benefits of the category *Costs/Earnings* are seen as product of the realization of benefits from other categories.

The most important benefits according to experts' opinion are assigned to the categories *Time*, *Quality* and *Efficiency/Effectivity*. Increasing transparency as well as data quality and availability is evaluated as highly relevant and is mentioned in each screened literature source. Reduction of lead and transaction times, better integration with LOB/divisions, increase of efficiency/effectivity and improvement of automation levels are evaluated with 1,25 in average. Worth mentioning is that the improvement of the integration with LOB/divisions is not mentioned by experts before. Furthermore, the reduction of coordination effort, improvement of decision quality and prevention of Maverick Buying are evaluated with an average under 2, though not mentioned before by the experts.

This result underlines the missing understanding of benefits as well as a lack of known applications to realize them in the industrial environment.

Table 8: Expert Opinion on analyzed Benefits of digitalized procurement

Potential benefits	**Literature Frequency**	**Literature Share [%]**	**Expert Opinion**	**Average Evaluation**
Costs/Earnings	**23**	**21,5**		
Decrease Purchase Costs	11		Mentioned	
Decrease Process Costs	5		Not mentioned	
Increase Productivity	4		Not mentioned	
Improve Profitability/Margins	2		Not mentioned	
Reduce Quality Costs	1		Not mentioned	

Potential benefits	Literature Frequency	Literature Share [%]	Expert Opinion	Average Evaluation
Time	**20**	**18,7**		**1,81**
Reduce lead and transaction time	15		Mentioned	1,25
Shortening delivery times	2		Not mentioned	2,75
Increase time for strategic issues	2		Mentioned	1,50
Reduction of coordination effort	1		Not mentioned	1,75
Quality	**29**	**27,5**		**1,8**
Increase Transparency/Data Quality and Availability	15		Mentioned	1,00
Improve decision quality	7		Not mentioned	1,50
Improve product and process quality	4		Not mentioned	2,75
Increase customer satisfaction	2		Not mentioned	2,50
Improve integration with LOB/divisions	1		Not mentioned	1,25
Risk	**10**	**9,3**		**2,58**
Minimize purchase risks	7		Mentioned	3,00
Increase security of supply	2		Mentioned	2,50
Improve risk evaluation of suppliers	1		Mentioned	2,25

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Potential benefits	Literature Frequency	Literature Share [%]	Expert Opinion	Average Evaluation
Efficiency/Effectivity	**14**	**13,1**	**3**	**1,33**
Increase Efficiency/Effectivity in general	11		Mentioned	1,25
Increase level of automation	2		Mentioned	1,25
Reduce Waste	1		Mentioned	1,50
Others	**11**	**10,3**		**2,35**
Increase Flexibility/Agility	4		Not mentioned	2,50
Deny Maverick Buying	2		Not mentioned	1,75
Increase level of innovation	2		Not mentioned	2,75
Improve stock levels	2		Not mentioned	2,00
Improve supplier scouting and onboarding	1		Mentioned	2,75
Number of Mentions	**107**	**100 %**	**16**	

Another part of the expert interview is to analyze the maturity level of digitalized procurement. The evaluation is based on already realized applications of technologies. The evaluation of the maturity level is based on the framework of Pellengahr et al. (2016) in which the maturity level is separated into 7 levels, with level 1 indicating the lowest level of maturity:

1) No activities
2) Recognized potentials / first observations
3) Concrete observations for realization
4) First application in realization
5) First application near realization
6) 1 to 2 applications realized
7) 3 or more applications realized

The survey of Pellengahr et al. (2016) delivers a similar result as the expert interviews. The perception of benefits through digitalized procurement as well as the maturity level is high, while the definition of *Procurement 4.0* is highly divergent from expert to expert. They mention technologies, which are not seen as pioneer technologies of Procurement 4.0. The knowledge about so-called 4.0-technologies is insufficient. Table 9, in which the planned or realized applications of the experts are illustrated, underlines this statement.

Table 9: Planned or realized applications in practice

Application	**Status**
Robotic Process Automation	In Use
Artificial Intelligence for evaluation of pandemic development	In Use
Artificial Intelligence for global risk management	In Use
Implementation of global ERP-system	In Development

Application	**Status**
Implementation of WMS (Warehouse Management System)	In Development
Semi-automated invoice verification	In Use
Implementation of ERP-system	In Development
Implementation of SRM-system	In Development
Implementation of commodity management system	In Use
Implementation of Power BI solution	In Use

4 Summary

Digital procurement is not just a trend, it is a necessary step for future competitiveness. Typical 4.0-technologies will help to transform traditional purchasing sustainably. Procurement must react in real-time, which requires fully digitalized processes. Therefore, structural and processual adaptions are necessary. Not only processes will be digitalized, also supplied products and materials undermine digital changes. Digital procurement will help to handle a digitalized supply portfolio while operative purchasing processes can be executed nearly automatically by using f.e. robotic process automation. Therefore, operative purchasing and the role of purchaser will change to more strategic-oriented roles working together in groups of with changing qualification profiles. In future, data science, management of interfaces as well as coordination and controlling will be focused in smaller and strategic-oriented purchasing teams. (Pellengahr et al. 2016)

To start the transformation, procurement managers must be familiar with the most valuable benefits of digitalized procurement. As the result of this research shows, there is less common understanding between the scientific and practical opinion. Especially in Table 9 experts are reporting about technologies in their sense of digitalized

procurement, while most of these applications and technologies do not fit to the idea of Procurement 4.0 and should already be state-of-the-art since years.

By evaluating the statements of the experts, many variations are recognizable. Therefore, the research questions should be analyzed in detail by drawing up further research in the form of a quantitative survey to get more and detailed information about the expert's knowledge and understanding about digital procurement and the maturity level of industry as well as how to make the next step of development or even to start the development in digitalization of procurement. This and further surveys should help to understand the need for digitalization in procurement to face future challenges.

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