

DIGITALISATION AND PROCUREMENT CONTROLLING – ANALYSIS OF THE IMPACTS BASED ON A TIME-SERIES JOB ADVERTISEMENT INVESTIGATION

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Abstract

For some time, it is discussed which effects digitalisation has for the primary business function procurement and the secondary function controlling providing information and support tasks. It can be stated that the integration of digitalisation in these areas is continuously increasing. In the combined discipline of procurement controlling the first steps towards a more intensified digitalisation can be observed. Main drivers are (1) the digitalised products, (2) the available and needed information from and of the suppliers as well as (3) the methods to process these mass data with the help of artificial intelligence. This article targets on evaluating the status quo of digitalisation on professional roles in procurement controlling jobs and the steps that can be expected in the near-future. Therefore, several hypotheses are derived. They are evaluated with the help of job advertisements analyses. The comparative analysis is based on several examinations done in the past (15 studies between 1978 and 2018) for the general controlling function and two recently conducted studies (2019 and 2021) by the author.

Keywords: Digitalisation, Procurement Controlling, Job advertisement analysis, strategy orientation, risk profile changes, rise of IT relevance

1. OBJECTIVE

The consequences of digitalisation for the procurement sector or procurement controlling have been given little attention up to now, especially in business practice. In contrast, areas such as production, sales or even the financial sector have been included in digitalisation initiatives to a much greater extent (Schentler and Schlönsen 2016, p. 85). Some argue that the importance of controlling support in procurement, as well as logistics and administration, will decrease due to cyber-physical systems (Lingnau and Brenning 2018, p. 158).

The impact of digitalisation on procurement controlling will be derived from a brief general description of the specific effects for procurement and controlling. Both fields will have implications for the design of procurement controlling in the context of digitalisation. These prognosticated implications are converted into hypothesis. Finally, these hypotheses will be subject to an empirical examination. The job advertisement analysis method will be used for this purpose. Therefore, two job advertisement analyses were conducted in 2019 and 2021. The results of these investigations will be compared with studies executed between 1986 and 2017.

2. DIGITAL TRANSFORMATION OF PROCUREMENT

By analogy with the collective term for the possibilities of digitalisation in the production sector (Industry 4.0), the changes that have already been implemented and are expected in procurement will be described using the term **Purchasing 4.0**. In this context, purchasing is attributed a significant joint responsibility for the implementation of Industry 4.0 Cf. (Feldmann and Henke 2016, p. 25). In addition to the changes in purchasing objects and processes, strong savings are also expected. According to a survey of purchasing managers, the average saving thanks to the effects of digitalisation was 21 % Cf. (Kleemann and Glas 2017, p. 32). The **essential influencing factors** in digitalisation are the intelligent systems, real-time communication and digital networking between companies and suppliers as well as value-added steps.

Effects will especially be found in the automation of processes, which takes over many tasks of operational purchasing, for example, through the use of ‘Robotic Process Automation’ [RPA] without user intervention (Feldmann and Henke 2016, p. 8, 21) or significantly improves warehousing through the use of predictive planning (Kersten et al. 2014, p. 9, 24). Another area of impact worth highlighting is the intelligent assessment of suppliers in terms of digitalisation capability (Kleemann and Glas 2017), data security, compliance with and adherence to regulations, which increasingly uses analytical methods and is based on a greater variety of sources. Another area of impact is the further development of value networks which are increasingly synchronised. The next relevant area of impact is the digitalisation of procurement objects themselves (Müller-Seitz et al. 2016, p. 26). The markets themselves are going to become digitalised thanks to an increased use of web-based negotiation tools, thus reducing handling costs (Wirtz and Kleineicken 2005, p. 339 f.). The effects are summarised in **Error! Reference source not found.**

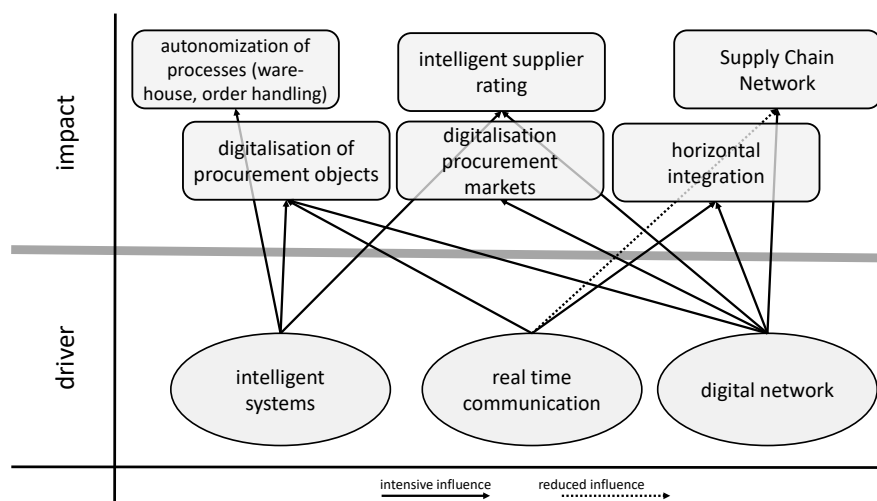


Fig. 1. Changes as part of Purchasing 4.0

Source: (Kleemann and Glas 2017, p. 14) and (Jonen 2020, p. 352)

3. IMPACT OF DIGITALISATION ON CONTROLLING

The changes from traditional to digitalised controlling can be illustrated as in Fig. . For this purpose, the transition from traditional to digitalised controlling is shown in three respects:

1. How does the relevance (size of the oval) of the tasks change?
2. What new areas of responsibility emerge?
3. What factors lead to the changes?

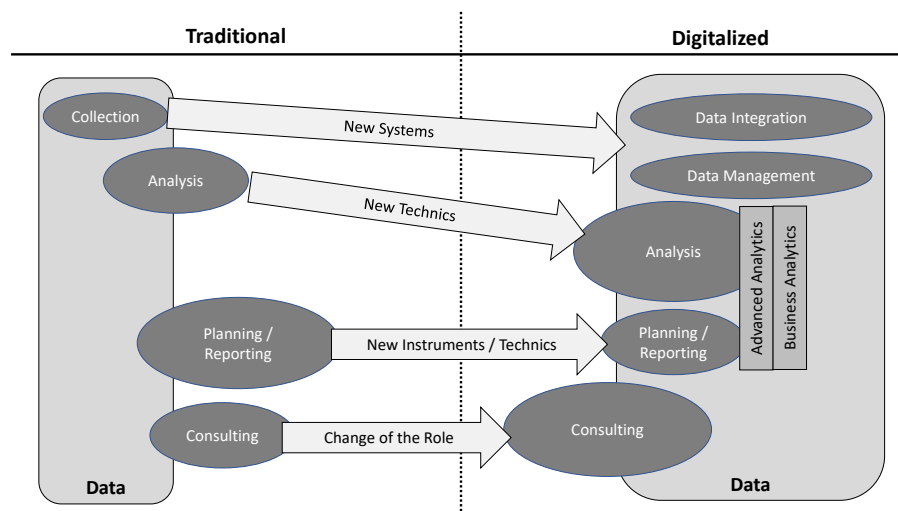


Fig. 2. Changes to controlling through digitalisation

Based on (Mödrischer and Wall 2019, p. 391)

4. SPECIAL IMPACT OF DIGITALISATION ON PROCUREMENT CONTROLLING

Building on the changes for the procurement sector and general controlling, the adjustments for procurement controlling due to digitalisation are set out below. The focus here is on the areas of change that are particularly suitable for analysis in the planned job advertisement analysis.

Owing to the automation of operational activities enabled by digitalisation (Kersten et al. 2014, p. 111), such as deviation analyses, **strategic activities** will become more relevant in procurement controlling (Jonen 2019, p. 921). It can also be assumed that it will be easier to link purchasing data to data from other areas and thus strategic decisions will be able to be better prepared by procurement controlling (Schentler and Schlünsen 2016, p. 86).

As a result of the increase in data and the options to process this data, **IT skills** will become more relevant in procurement controlling. As part of this, there will be an increase in **IT-related tasks** as well as **collaboration** with the **IT department**. This can be concretised by the use of predictive analytics in demand forecasts. Using this technology, forecasts can be made on the necessary procurement objects based on past data, current inventory and order data as well as the inclusion of external data. In this way, orders can be automatically triggered Cf. (Schentler and Schlünsen 2016, p. 86; Kleemann and Glas 2017, p. 18). Furthermore, the prescriptive methods can be used to calculate raw material price forecasts. Maximum prices, optimum order quantities, the ideal time of purchase or procurement strategies, such as natural hedging, can be derived therefrom (Mödrischer and Wall 2019, p. 400–402; Schentler and Schlünsen 2016, p. 93). IT-skills and tasks are also necessary as a result of the increasing offer of digital reporting for the procurement area as well as for other functional areas. Another area is supplier assessment, which can be automated to a large extent and, in terms of interdependencies, analysis can be carried out using artificial intelligence (Schentler and Schlünsen 2016, p. 90).

Digitalisation entails changes in the **risk profile** for the procurement sector (Jonen 2008, p. 26–32). The risk of dependence on technology providers should in particular be subject to intense analysis in this context (Kersten et al. 2014, p. 112). Other procurement-relevant risks with increasing significance are different security standards along the supply chain and IT interface problems in the process (Seiter et al. 2015, p. 472).

Table 1 shows the summary of the prognosticate changes for the procurement controlling.

#	Causal factor	Impact hypothesis
1	Intelligent systems	The main tasks shift from operational to strategic tasks as a range of tasks can be taken over by IT systems in the operational area
2	Increase in amount of data (-sources, depth, quality)	IT skills are increasingly sought after in order to be able to analyse the available data and digitalise processes
3		IT-related tasks will become increasingly common
4		Closer collaboration with IT sector
5	Risks (only assessed in re-evaluation)	Increasing digitalisation results in new risks in the area of procurement, for example due to problems with IT interfaces within the supply chain network. In addition, the probability of a risk occurring and the extent of the risk increase in the case of existing risks.

Table 1. Hypotheses on the effect of digitalisation in procurement controlling

5. EMPIRICAL EXAMINATION – JOB ADVERTISEMENT ANALYSIS

5.1. Justification of the research method

The logically derived consequences of digitalisation will be examined empirically. For this purpose, it is necessary to derive an **adequate methodological approach** (Bott 2007, p. 109).

As it can be assumed that job advertisements have a fundamental significance with regard to the current skill requirements in the labour market, they should constitute a suitable data source (Wildgrube 2018, p. 66, 84; Goretzki et al. 2010, p. 59). Alongside the information on the current situation, job advertisements can also be assigned a prognostic value (Mehra and Diez 2017, p. 2).

In the **past**, analyses of job advertisements were carried out for controllers at regular intervals to determine the current status and possible developments of institutionalised controlling (28 studies from 1978 to 2020 were included in the analysis).¹ Previous studies have only marginally dealt (0.7 % (Gege 1981, p. 1294) – 2.0 % (Eschenbach and Junker 1978, p. 4) of the job advertisements analysed) specifically with the area of procurement controlling. These studies are used, where possible, as a benchmark. An overview of the studies is shown in table 2.

Authors	Year	Quantity	Sources	Procurement relevance	Results regarding digitalisation
(Eschenbach and Junker 1978)	1976/77	386	five newspaper	13 of the job advertisements (2 %)	data processing: 4 %
(Bramseman 1980) ²	1974/76	116	newspapers	-	28 % special DP-knowledge (7 th place at American and 6 th place for other companies)
(Gege 1981) ³	1976/79	300	newspapers	procurement 2 out of 300 advertisements (0,7 %) explicitly cited as task	DP/organisation at the 3rd place with 52 requests out of 300
(Pfohl and Zettelmeyer 1986) ⁴	1986	86	not specified	-	statistics do only have an inferior role (2 mentions), high relevance of automated DP (29 mentions and therefore second highest request regarding the professional requests) ⁵

¹ See (Pfohl and Zettelmeyer 1986, p. 125 ff; Traxler, A., A. / Greiling, D. 2014, p. 57 ff; Weber and Kosmider 1991, p. 17 ff; Weber and Schäffer 1998, p. 227 ff; Zettelmeyer 1986, p. 125–132; Peemöller, V., H. / Schmid, R. / Meister, U. 1989, p. 227–231).

² Quelle: (Bramseman 1980): S. 20ff.

³ Vgl. (Gege 1981): S. 1293ff.

⁴ Quelle: (Pfohl and Zettelmeyer 1986): S. 126.

⁵ Vgl. (Pfohl and Zettelmeyer 1986): S. 126.

(Peemöller, V., H. / Schmid, R. / Meister, U. 1989)	1985/87	Controlling: 1661 Revision: 495	two newspapers	not specified	basic knowledge in DP as necessary identified
(Berstorff 1990) ⁶	1987/88	304	Frankfurter Allgemeine Zeitung	-	specific DP-knowledge: 23.45 %, general DP-knowledge: 28.80 %, no specification of necessary DP-knowledge: 47.75 %
(Görg 1991)	1989/90	100	not specified	not specified	DP-knowledge: 18 %
(Steinle et al. 1996)	1995	124	Frankfurter Allgemeine Zeitung	-	DP/software: 9 %
(Kalwait, R. / Maginot, S. 1998)	1996	397	Frankfurter Allgemeine Zeitung, Süddeutsche Zeitung	purchasing not named as a functional special discipline	DP-knowledge: 67 %, SAP R/3: 15 %
(Preißner 1998)	1998	600	Frankfurter Allgemeine Zeitung	no purchasing data only logistics with 1.0 %	DP-knowledge: 76 % area of activity: 10,5 % management information system
(Weber and Schäffer 1998)	1990/94	9.798	Frankfurter Allgemeine Zeitung	-	IT-knowledge: 12 %
Borchers S, Trebes D (1999)	1996/98	103	three newspapers	-	DP-knowledge: 48 % strategic planning: 52 %, operational planning: 24 % consulting: 58 %
Littkemann, J. / Eisenberg, D. / Lerchl, S. (2007)	2004/06	244	newspapers and online job exchange portal	-	DP-knowledge: 82 %
(Krupp and Tilgen 2008)	2007	50	German job portal and web pages of executive search companies	-	MS Office: 29 %, SAP: 23 %, special DV-knowledge: 9 % analytical skills: 57 %
(Fenzlein 2009)	2003/07	1.337	Frankfurter Allgemeine Zeitung / Süddeutsche Zeitung	1.44 % purchasing controlling	tasks: 3 rd place information supply (72.3 %), 5 th place consulting (66.6 %), 7 th place projects (45.3 %) knowledge: 2 nd place DP-knowledge (92.8 %), high correlation of needed knowledge in MS-office and SAP
(Krupp and Ljuboschiz-Ramien 2010)	2009	44	randomized chosen	-	professional knowledge: 32 % MS Office, 25 % SAP R/3, 4 % IT-systems personal requirements: 61 % analytical thinking
(Berens et al. 2013b)	2012	189 (DAX-30 und MDAX)	company web pages	-	IT-area: DV-Organisation (19,0 %)
(Berens et al. 2013a)					MS-Office: 76.7 %, SAP: 59.3 %, general DP-knowledge: 22.2 %
(Traxler, A., A. / Greiling, D. 2014)	2012	1.050	online job portal in Germany, Austria and Switzerland	-	IT-knowledge: 87 % (4 th important category), enormous increase compared to former years
(Gruber 2015)	2004/13	817	Austrian Newspaper	-	-
(Sageder and Wiedemann 2019)	2015/16	247	Austrian job portals und career network	-	ERP-knowledge: 62 %, Excel-knowledge: 57 %
(Werner and Vester 2017)	2016	200	online job advertisements in Germany (company websites, online job portals)	-	IT-knowledge: MS-Office: 65 % (3 rd place), MS-Excel 47 % (6 th place), ERP-System 45 % (7 th place), general IT-knowledge 20 % (8 th place)
(Mayr et al. 2017)	2015	1121	job advertisements for finance jobs, only print media	-	-
(Drerup et al. 2018)	2018	HDAX (DAX, MDAX and TecDax in 2017)	company web sites	-	IT-knowledge: 90.5 % / analytical skills: 70.1 % / coding knowledge: 9.1 % / statistic software knowledge: 0,9 %
(Wildgrube 2018)	2012	427	Online job advertisements (e. g. Monster)	-	software knowledge: 64 %

⁶ Quelle: (Berstorff 1990): S. 9.

(Freistühler et al. 2019)	2018	241 thereof 150 for controller	Career-pages of DAX and MDAX (Germany)	-	tasks: 43 % Excel, 69 % SAP, 1 % big data knowledge: 73 % MS Office, 69 % SAP, 11 % programming, 13 % data banks
(Mayr et al. 2020)	2020	2.368	All job advertisements in Austrian print media and online	-	data management much more often mentioned, cost accounting halved

Table 2. Hypotheses on the effect of digitalisation in procurement controlling

5.2. Approach

Various sources are available for carrying out the job advertisement analysis, as the previously conducted studies in the past show. Job portals, business networks (e.g. Xing), company-specific career pages and print media (e.g. FAZ) seem relevant. The disadvantage of print media is that longer texts are expensive, which is not the case for websites (Mayr et al. 2020, p. 13). The characteristics and tasks can therefore be described in more detail online. In addition, it can be assumed that only particularly important positions are selectively advertised in print media (Weber and Schäffer 1998, p. 227). This limitation does not apply to online job advertisements as these are considerably cheaper (Berens et al. 2013b, p. 226).⁷

Another argument in favour of **online media** is that it has already played an important role in recruiting for some years (Bott 2001, p. 88). Moreover, data from online advertisements are easier to process due to the digitalisation that has already taken place and the uniformity of the structure (Mehra and Diez 2017, p. 3). In terms of job portals, some people are critical that distortions can occur because some companies may (Weber and Kosmider 1991, p. 18) only publish content via their own company website due to personnel policy principles (Wildgrube 2018, p. 135).

The various types of sources were assessed according to the criteria of relevance, representativeness (all size classes and all levels of digitalisation maturity represented) as well as effort to collect data. In an equal weighting of the four selection criteria, the **job platforms** have the highest rating. There are various job platforms, such as Monster, Stepstone or Jobstairs. Given that the risk of duplication would have risen considerably if several job portals were included in parallel, one of the portals had to be selected. Relevant features for the selection are the *reach* (Crosswater Job Guide 2018), the *awareness* amongst users (Statista 2017), as well as the relevance for positions in the field of procurement controlling (*specifically quantity*), measured by the number of hits for the keywords “procurement controlling”. It is not sensible for the number of hits to be the sole criterion here as it can frequently be observed that completely unsuitable job advertisements are offered in the hit list, especially at the end of the list (Mehra and Diez 2017, p. 3). The weighted result of the investigation shows that the portal Stepstone is the most suitable for the desired objective of the study.⁸

For the evaluation of job advertisements, a mixed approach was followed in the **formation of categories**. For example, to a large extent a deductive approach was taken and recourse was made to existing studies. Only in those cases where previous analyses had not yet examined the hypotheses, an inductive formation was undertaken. The job advertisements were saved as PDF-documents and analysed using MAXQDA software. To achieve higher reliability, two coders were used in series. Following the **consensual coding method** (Hopf and Schmidt 1993, p. 61 f.), the second coder checked the results of the first coder and in case of deviations, a common coding solution was found.

5.3. Description of the sample

5.3.1. Fundamentals

The reference day for collecting the job advertisements was 22/05/2019. To select the advertisements, all controlling adverts were initially searched and these were filtered with the criterion ‘Purchasing,

⁷ (Eisl et al. 2012) noticed in a comparative study that there are only little differences between online and print advertisements. Cf. (Eisl et al. 2012, p. 87).

⁸ Examination of (Mehra and Diez 2017) identified Stepstone as the best alternative. Cf. (Mehra and Diez 2017, p. 4). The ranking of (Crosswater Job Guide 2018) has Stepstone in first place in 2016 – 2018. See (Crosswater Job Guide 2018).

materials management and logistics' in the field 'Occupational field'.⁹ This identified 228 job advertisements. These were then checked manually, for example, in order to deselect job advertisements where control was to be exercised over something or which contained internship offers or advisors. After completion of this step, there were **55 job advertisements** to be analysed.

In this sample, 47 % of the adverts have the title controlling or controller, 38 % of the offers have the title purchaser or purchasing and 13 % have a managerial job title (Manager / Team Leader). In 18 of the adverts, there was a classification in terms of junior (61 %) and senior position (39 %).

5.3.2. Representativeness: sector and size distribution

In order to check the homogeneity of the sample, the sector and size distribution of the sample is analysed. The **sector distribution** has a large concentration in the industrial sector (57 %). The second largest sector is trade (20 %). (Fenzlein 2009) had demonstrated for his study that the distribution detected for this study is in line with comparable studies (Fenzlein 2009, p. 71). The present distribution has a correlation of 0.892 (significance level: 0.01) to the distribution with (Fenzlein 2009) and therefore offers very good comparability.

Based on the information in the job advertisement, 2/3 of the companies were identified as large companies. A further 22 % are medium-sized companies. Small companies are not included in the sample. For 6 job advertisements (11 %), which were placed by recruitment agencies, it was not possible to determine the size of the company.¹⁰ The **predominance of larger companies** can be explained by the specialisation of the positions that were searched, as there is not usually an individual position for this in smaller companies.

5.3.3. Results of the job advertisement analysis

There are two ways to evaluate the job advertisements. On the one hand, there is the historical comparison and, on the other hand, the comparison between different groups (e.g. small vs large companies). As the hypotheses focus on an increase in certain knowledge or tasks, reference is made below to the historical comparison with the limitation that the past studies used have always referred to controlling in general and not to procurement controlling.

Increase in strategic activities (hypothesis 1)

In order to verify the increase or dominance of individual fields of activity, the specified fields of activities were classified as either strategic or operational. It was determined here that 53 % of the job advertisements describe strategic activities and 35 % operational activities. This is, table 3 shows, with reference to the surveys carried out so far for the controlling sector, the highest value found for strategic activities.

Activity	(Pfohl and Zettelmeyer 1986)	(Weber and Schäffer 1998)	(Preißner 1998)	(Borchers and Trebes 1999)	(Eisl et al. 2012)	(Berens et al. 2013b)	(Mayr et al. 2017)	(Werner and Vester 2017)	(Mayr et al. 2020)	(Jonen 2020)
Strategic	26 %	4 %	9 %	52 %	39 %	23 %	9.2 %	15 %	14 %	53 %
Operational	5 %	-	-	24 %	-	34.4 %		-		35 %

⁹ See for approach to selection of controller positions and similar positions to controlling (Weber and Schäffer 1998, p. 228).

¹⁰ The European Commission SMEs definition was used for classification, whereby a small company has up to 49 employees and a turnover not exceeding 10 million EUR, a medium-sized enterprise has up to 249 employees and a turnover not exceeding 50 million EUR and large companies are anything above this.

Table 3. Distribution of strategic and operational activities

Source: Cf. (Jonen 2020, p. 367) with reference to (Weber and Schäffer 1998, p. 229; Werner and Vester 2017, p. 58)

There are thus clear indicators that this hypothesis does not have to be rejected.

5.3.4. Increase in the need for IT skills (hypothesis 2)

87 % of the job advertisements for procurement controller require IT skills in 2019. This is the third highest value ((Fenzlein 2009) had a value of 92.8% and (Drerup et al. 2018) of 90.5 %) demonstrated in a job advertisement study for controller positions in the past.¹¹ Over the years, there is evidence of a significant increase (Significance level 0.01) in the requirement to have IT skills, as Fig. 3 shows.

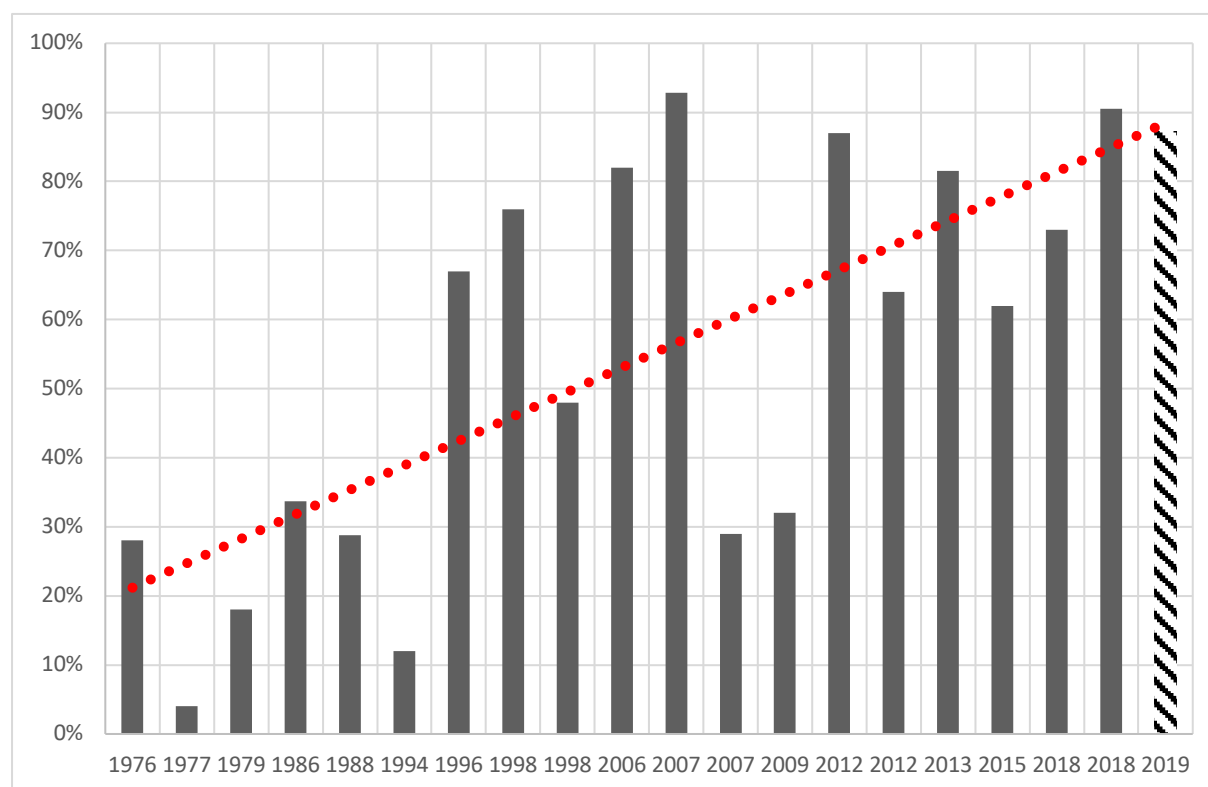


Fig. 3. development of the relevance of IT skills

Source: On the basis of (Jonen 2020, p. 368)

IT skills can be divided into experience in using MS Office (58 %), or specifically Excel (45 %), SAP (49 %) and general IT skills or database knowledge (33 %). This analysis demonstrates the increase in the need for IT skills for controlling or specifically for procurement controlling.

5.3.5. Increase in analytical activities

Analytical activities can be found again in 82 % of job advertisements. This is considerably higher than the figure obtained by (Berens et al. 2013b) with 57 %, (Krupp and Ljuboschiz-Ramien 2010) with 61 % and (Krupp and Tilgen 2008) with 57 %. Due to the limited number of studies that have examined the

¹¹ This statement is based on the basic assumption that there is parallelism in job advertisements for controlling in general and specifically for procurement controlling.

proportion of analytical activities, no definitive statement can be made regarding the acceptance or rejection of this hypothesis.

In terms of digitalisation, direct references to this keyword were currently identified in 24 % of job advertisements.

5.3.6. Closer collaboration with the IT sector (hypothesis 4)

Collaboration with other departments was identified in 78 % of job advertisements. Most frequently, cross-sectoral cooperation with non-specified or a variety of departments was indicated (58 %). Logistics were occasionally specified (two instances) and production (one instance). The IT sector was explicitly mentioned as an interface area in 5 of the 55 job advertisements (9 %). The extent to which this sector was also included in interdisciplinary mentions cannot be determined.

5.4. Re-evaluation result

The results were re-evaluated in May 2021, two years after the first examination. Due to partly overcome the disadvantage of not having comparative data and to have the chance to analyse the effects of the Covid19 pandemic (keyword: jump-digitalisation), this second evaluation was conducted. In the course of the experiences with the pandemic and the effects in the area of risks caused by digitalisation (Mayr et al. 2020, p. 9), the hypothesis framework was expanded to include this aspect.

Again, the portal 'Stepstone' was used. This time results of the portal 'Monster' were integrated in the sample. This was necessary to have a comparable number of job advertisements (50). The reference day for collecting the job advertisements was 22/05/2021 and a duplication test was conducted. The distribution of adverts with the title controller or controlling versus purchaser or purchasing is 48 % versus 42 % and this way very similar to the evaluation in 2019. The predominance of large companies in this sample is even stronger (84 % large and 16 % medium-sized versus 76 % and 24 % in 2019). The sector distribution is similar to the sample in 2019: 52 % industrial sector and 24 % for trade and 24 % for service sector.

The results of the analysis of the five hypotheses are shown in table 4.

# Hypothesis	2021	2019
1 Shift from operational to strategic activities	56 % strategic activities (strategic as keyword, potentials, risk analyses, fundamental decisions)	53 %
2 IT skills	88 % IT skills (72 % MS Office, 40 % SAP), already 10 % asking for BI-Tools or AI	87 %
Analytical tasks	not analysed due to difficulties regarding the code definition	82 %
3 IT tasks	36 % included tasks with connection to IT (10 % ERP-System, 8 %SAP)	27 % (follow-up investigation)
4 Closer collaboration with the IT department	10 % have direct tasks together with the IT department	9 %
5 New risks	22 % of job advertisements refer to risk ¹²	7 % (re-analysis)
<i>trend confirmed</i>	<i>no analysis / comparison possible</i>	<i>trend not confirmed</i>

Table 4. Results of re-evaluation

¹² Keywords were: risk, risks, risk management, risk controlling (not mentioned), risk reduction, risk analysis, early warning system and procurement risk management.

The re-evaluation of the hypothesis shows that the trend which was detected in 2019 is ongoing, but did not get a significant boost due to the Covid19-conditions.

6. CONCLUSION AND LIMITATIONS

The logical derivation of the effects of digitalisation on the field of procurement controlling, which has not been largely examined until now, regarding the analysis of the digitalisation effects in procurement controlling, has been able to identify a number of focus areas and make forecasts for resulting changes. The subsequent verification of selected developments using job advertisements has demonstrated clear trends for the increase in relevance of IT skills, strategic activities and risk management. This could be confirmed in the follow up study undertaken in May 2021, where the suggestion that Covid-19 is a catalyst for digitalisation could be confirmed for some parts.

Regarding the research method, the biggest disadvantage is the missing of comparative studies in the field of procurement controlling. Additionally, it is not possible to make any proposition regarding the level of digitalisation of the captured companies. This way it is not clear if the sample is representative regarding this characteristic. This is also applicable for the over-representation of the industrial sector and large-scale enterprises (Gruber 2015, p. 54, 78). (Sageder and Wiedemann 2019) have shown in their analysis that company size, internationalisation and the hierarchy level of the position have a strong influence on the requirements in job advertisements. This is particularly true for ERP and IT knowledge. (Sageder and Wiedemann 2019, p. 434, 442).

Approaches for further research are:

- At the moment only two data sets from 2019 and 2021 do exist. This way the results are no proof for the hypothesis. They can only show tendencies. An execution of an analysis with a considerable higher number of job advertisements is necessary to be able to perform hypothesis testing.
- Differentiation of requirements according to hierarchical level, i.e. junior and senior controller (Sageder and Wiedemann 2019, p. 437) should take place.
- While performing the analysis of job advertisements it was presumed that there is a high conformity concerning general controlling positions and special procurement positions. It has to be examined if the tasks and requirements for both positions are the same (Losbichler and Ablinger 2018, p. 56).
- Further countries have to be included to evaluate if there are detectable country-specific particularities.
- The job advertisement analysis has to be supplemented with surveys and / or expert interviews to evaluate the areas where job advertisements could not give indications.

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