Contradictions and Complements of Lean Administration and Digitalization

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Abstract

Background – In order to withstand an increasing pressure of competition, to provide customers with constantly improved quality and innovations, while at the same time securing the financing from operating businesses, processes have to be optimized and non-value-added activities have to be eliminated. In this context, recent digital technologies promise significant improvements in managing complexity. Congruently, administrative power must be continuously increased to keep overheads low. Lean administration offers this potential.

Purpose – This paper contributes to the discussion on the relationship of lean administration and digitalization, and whether companies should excel in either first before drawing to the other.

Methodology/Approach – In order to address the research question, expert interviews have been chosen as a qualitative approach. Process managers and Lean experts of companies from different industrial sectors were interviewed to investigate the relation of lean administration and digitalization.

Findings – Results show that on the one hand lean administration can profit from advances in digitalization, while on the other hand lean administration supports the digital transformation. Experts attest both a symbiotic relationship. Furthermore, a correlation between a company's lean and digital maturity is observed. Rather than either of both is a prerequisite for the other, they rely on similar organizational conditions and requirements.

Keywords
Lean Administration, Digitalization, Expert Interviews

1. Introduction

Digitalization is a major trend fundamentally changing both, society and business. Its transformation encompasses the changes taking place in organizations, industry and every day's life, through the application and adaption of digital technologies **(Majchrzak, et al., 2016)**. However, contrary to the general opinion, new digital technologies are just another small piece of the highly complex puzzle **(Svahn, et al., 2017; Selander & Jarvenpaa, 2016)**. A comprehensive and highly dynamic digital strategy **(Chanias, et al., 2019)**, a positive error culture to break away from old patterns **(Singh & Hess, 2017)** or a corporate structure and employees that support the transformational processes **(Vey, et al., 2017)**, are just as important as technology itself. Lately digital transformation became a necessity **(Evans, 2017)** that jeopardizes those corporations not engaging in the process. **(Allweyer, 2016; Fersht, et al., 2018)**. Digitalization and globalization are spreading at a breathtaking pace, resulting in a constantly increasing pressure of competition **(Magenheimer, et al., 2014; Nadarajah, et al., 2014)**. In order to withstand this pressure and to provide customers with continually improved quality and innovations, while at the same time securing the financing from operating businesses, companies have to optimize their processes and eliminate non-value-adding activities **(Allweyer, 2016)**. Therefore, business-relevant processes in production and administration must be continuously improved **(Brenner, 2018; Ko, et al., 2009)**. Lean Management is a promising approach offering numerous methods and tools for a more efficient design and optimization of processes **(Gorecki & Pautsch, 2013)**. In this context, the discussion on digitalization of business processes is fueled by a promise of significant improvements in managing complexity and further achievements for the organizational performance **(Peppard, 2016)**. Innovative technologies promote transparency, networking and automation of business processes offering great potential for companies in all industry sectors. (Heemsbergen, 2016; Seele & Lock, 2017; Fichter, 2019) In administrative areas in particular, increasing digitization has had a significant impact on the resource inventory in our everyday work. A workplace without a computer, tablet or smartphone is inconceivable (Schwarzmüller, et al., 2015). At the same time, new opportunities arise, such as mobile working from home (Klimmer & Selonke, 2017; Latos, et al., 2017). This raises the question on how these new technologies and spreading digitalization in offices can be combined with the often already established lean management principles for process optimization and complexity reduction. Therefore, it remains unclear on how to best approach digital transformation in administrative areas with a glance at lean administration. This paper contributes to the discussion on the relationship of lean administration and digitalization, its contradictions and complements and whether companies should excel in either first before drawing to the other. Therefore, representatives of sixteen German large-scale enterprises from different industrial sectors were interviewed by semi-standardized interview guidelines.

2. Lean Methods as a strategic trend in the office

Lean management has its origin in Japan and was introduced by Taiichi Ohno in the Toyota Production system (Ohno, 2013). It focuses the identification and elimination of waste in production processes to increase efficiency and thereby the customer satisfaction (Bertagnolli, 2018; Womack, et al., 1990). Lean management is understood as a philosophy that shifts the focus on an optimized way to deliver customer value (Bhasin & Burcher, 2006). For this purpose, the five principles of lean management were established: identify value, map the value stream, create flow, establish pull and seek perfection (Womack & Jones, 1996).
The success of lean management in production processes has been confirmed several times all over the world, so that, besides the classical lean production, a transfer to other divisions was conceivable. Thus, lean administration, also called lean office, has developed as further component of lean management (Brenner, 2018). Thereby, the same concepts, tools and methods of lean management are used at the administrative level (Larsson, 2008; Womack & Jones, 1996) to provide an increase in productivity and process quality within these indirect, administrative divisions (Wiegand, 2018). To that, the existing administrative processes have to be analyzed, simplified and optimized (Tautrim, 2014). However, the administrative level has been neglected for many years. Only selective efforts were made to optimize processes in an office setting (Danielsson, 2013). Although administration plays a crucial role in creating customer value, with more than 50 percent of the workforce ling in the office (Brill, et al., 2001), over one third of administrative processes are waste (Westkämper, et al., 2011). Up today, lean administration still is largely underestimated (Schuh, et al., 2013). In the age of digitization and increasing globalization, a strategic rethink is to be noticed. A constantly increasing pressure of competition forces companies to meet highly dynamic customer demands by continually delivering improved quality and innovations at pricing pressure. (Magenheimer, et al., 2014; Nadarajah, et al., 2014) Consequently, companies have to continuous improve business-relevant processes to become

more effective and efficient in response to changing customer demands. On the one hand, the successful implementation of lean management within production only allows for incremental improvements in this business areas. On the other hand administrative operations represent over 60 per cent of costs associated with meeting customer demands (Danielsson, 2013; Tapping & Shuker, 2003; Brenner, 2018). Thus, lean methods are becoming highly relevant within the administrative level.

When using lean administration, it should be considered, that there are differences between the administrative and the manufacturing environment (Chen, 2012). Since, in contrast to production, administrative processes do not produce any tangible and visible output (Antonioni, et al., 2005), recording the process and measuring key performance indicators is more difficult. Furthermore, not all tools of classic lean management can be used sensibly, so that only useful tools should be selected beforehand. For a successful implementation of the lean philosophy, both, in administrative and manufacturing processes, it is important that all employees live this philosophy. For this purpose, the employees must be trained in the appropriate tools, methods and principles (Asbach & Kamp, 2014).

3. Research Approach

In order to address the research question, this paper follows a qualitative empirical approach. Data collection is based on semi-standardized interviews. Process and Lean Managers of enterprises from different industrial sectors and Lean Experts were conducted, to investigate the relation of lean administration and digitalization. To ensure comparability of results interviews were based on an interview guideline.

3.1 Expert interviews as a form of semi-standardized interview

Qualitative interviews are one of the most popular methods used in empirical research. (Kaiser, 2014) In particular, many researchers use semi-standardized interviews. (Meuser & Nagel, 2009) Semi-standardized interviews are conversations based on a previously developed interview guideline. Since this guideline consists of non-standardized, open questions, this qualitative research approach is characterized by its openness in the course of the conversation. (Keunecke, 2005)

Expert interviews are a special form of this qualitative approach. (Misoch, 2014) The peculiarity is that the interviewee does not speak as an individual person but as an expert in a particular field. (Meuser & Nagel, 2009) Thus, the interviewee is limited to his expertise in an organizational or institutional context. The collective person with its individual life context moves into the background. (Pfadenhauer, 2009; Mayer, 2012) Typically, these qualitative approaches involve only a few participants. (Meuser & Nagel, 1994) This suits the aim of an expert interview to consolidate the knowledge of experts and to make it available to the researcher. (Pfadenhauer, 2009; Glaser & Laudel, 2010) Expert interviews are processed in three phases: planning, execution and analysis. (Kaiser, 2014) During the first phase, an interview guideline is developed and the experts, to be interviewed, are selected. The execution phase is followed by data evaluation. (Misoch, 2014)

3.2 Interview guide as an instrument of the semi-standardized interview

To guarantee a standardized process and to ensure comparability of results, the semi-standardized interviews are conducted on the basis of a previously developed interview guideline (Meuser & Nagel, 2009). In order to identify contradictions and complements of lean administration and digitalization, the interview guideline consists of three topical sections. At first, the status quo of the enterprises lean and digital transformation is examined. Among other things, representatives were asked when they started to implement lean administration and digitization of office processes, how successful implementation is and which areas they started with. The second topic deals with experiences in the implementation of individual projects and discusses the occurrence of difficulties during implementation. Representatives are also asked to report their motivation to take lean or digitalization meassueres. Finally, the third section focuses on the contradictions and complements of lean administration and digitalization. Therefore representatives elaborate on the potential of both, synergies observed during planning and implementation, perceived hurdles, strength and disadvantages of the lean and digital transformation, as well as on the. The order of sections is adaptable to the course of conversations (Klammer, 2005; Mayer, 2012). Questions split up into so-called key and contingent questions. (Keunecke, 2005; Friedrichs, 1990). Each interviewee is asked key questions in order to establish a certain comparability between individual conversations, regardless of the qualitative character of data (Schnell, et al., 2011; Bock, 1992). This ensures that all relevant topics are discussed. (Meuser & Nagel, 2009) The development of the conversation, on the other hand, is covered by contingency questions. These can be used to

concretize a topic or in case of misunderstandings (Mayer, 2012). In addition to the contingency questions, the interviewer can decide to ask additional question based on the situation. Thus, new starting points for further discussion can emerge.

3.3 Selection of experts and procedure of the interviews

Expert interviews lay emphasis on the representability of the content, because as such these type of semi-standardized interviews cannot produce representativeness in a statistical sense. Consequently, interviewees are representing the group under investigation rather than individual cases or themselves. (Mayer, 2012) The purposive selection of typical cases is crucial. (Kromery, 2002). In order to be considered as an expert, a person

   i)   has privileged access to relevant information and
   ii)   is responsible for implementation, conception or the control of
          the content under investigation. (Pfadenhauer, 2005)

To address the research question 18 expatriates were interviewed. All interviewees possess high-ranking positions in economy and were selected due to their job-related expertise of Lean and digitalization. In a first step, 28 enterprises that successfully implemented Lean Management were identified through market research, referrals and internet research. 64.2% of these large-scale enterprises already dealt with the topic of Lean Administration and were willing to take part in the study. In order to ensure that the selected experts know most about the current and future state of Lean Administration, the main persons responsible for implementing lean projects within an enterprise were identified and it was ensured that they had detailed information on the digitization process. Table 1 gives an overview of the selected experts that were willing to participate.

Table 1. Overview of selected experts

Expert		Company		
Code	Position	Sector	Revenue [Mio €]	Employees
E1	Specialist Lean Management	Mechanical engineering industry	840	1680
E2	Lean Manager	Iron and steel industry	1160	2400
E3	Chief Digital Officer	Logistics	5100	33100
E4	Lean Manager	Automotive supplier	580	2040
E5	Lean Manager	Metal industry	410	1000
E6	Head of Quality	Building industry	350	1180
E7	Corporate development	Insurance business	-	3650
E8	Lean Manager	Automotive Supplier	830	1800
E9	Operational Excellence	Mechanical engineering industry	610	1430
E10	Specialist Lean Management	Health Care	580	4570
E11	Corporate Development	Wholesaling	980	2280
E12	Head of Operational Excellence	Automotive supplier	960	1900
E13	Digital Officer	Insurance	39500	22530
E14	Lean Manager	Building Industry	430	1320
E15	Head of Quality	Logistics	760	4580
E16	Lean Manager	Telecommunication	5200	9400
E17	Head of Business Excellence	Automotive Supplier	1630	4200
E18	Lean Manager	Mechanical engineering	930	1820

Prior to the interviews, researchers explained the design of the study and what the gathered information is used for respectively to what extend it will be disclosed to others. Confidentially was assured. To prevent unwanted assignment of names to individual statements, access on the data was restricted and the anonymization of expert names was assured (Keunecke, 2005; Klammer, 2005). All participants gave written consent to record conversations, as recommended by Mayer (2012), and to anonymously analyzation of transcripts. The expert interviews were conducted by two researchers, with clear roles assigned. While one logged the interviews, the other led the discussion. To maintain consistency, roles did not change. Interviews lasted between 45 and 70 minutes.

4. Results and Discussion

The self-appraisal of the company representatives proposes a positive correlation between the maturity level of digitalization and the degree of progress with lean administration, $r(16)=.665$, $p=.003$. Companies that are at the beginning of their process improvement efforts in the office are also at the beginning of implementing digital transformation projects in this area. However, none of the representatives fit their enterprise into the category of digital beginner, while two see their enterprise to be a novice in the field of lean administration. Conversely, the advanced and lean experts also have a high degree of implementation of digital technologies. The majority of enterprises still tend to be in the initial or learning phase, though.
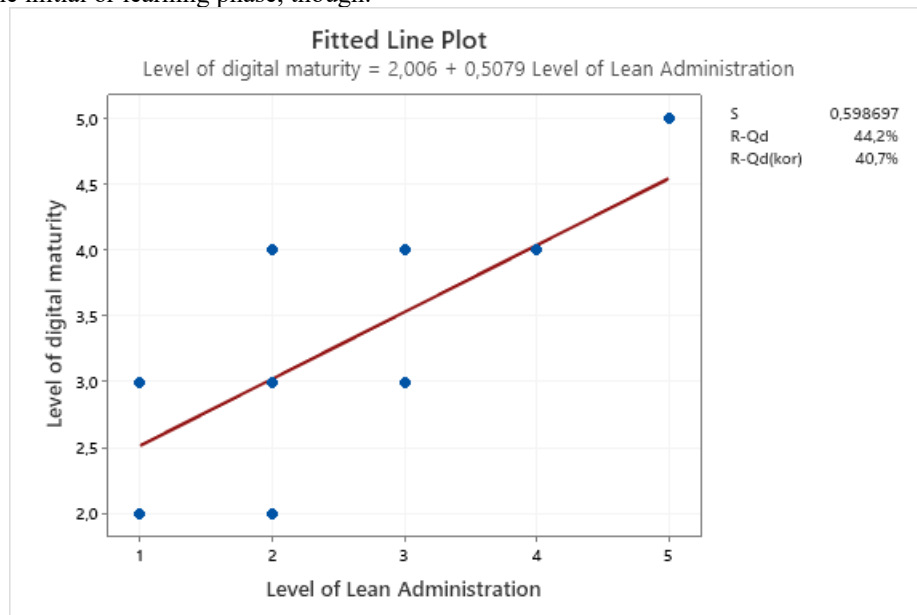

Fitted Line Plot
Level of digital maturity = 2,006 + 0,5079 Level of Lean Administration

S	0,598697
R-Qd	44,2%
R-Qd(kor)	40,7%

Figure 1 Level of digital maturity and maturity level of lean administration (n=18)

Current literature often sees operational excellence or lean management as the basis for sustainable digitization (Tsipoulanidis, 2017; Lorenz, et al., 2019), which would mean that companies should develop their digitization strategy from an advanced or Lean Administration expert position. Some even go the extra mile and argue that before digital transformation should be started, the enterprise must excel in lean process and structures and has to successfully establish the lean philosophy (Schneider, 2017; Wiegand, 2018). The experts critically evaluate this statement. On the one hand, the administrative area is a part of the company that has been neglected in recent years and almost all efforts to increase efficiency and effectivity can be attributed to the casual introduction of individual digital technologies, like computer hard- or software (E3, E10). On the other hand, the digital transformation in offices does not happen in a well structured way. Sustainable implementation of digitization strategies requires a holistic and, in particular, cross-departmental view. A process-oriented way of thinking that is enforced by lean philosophy (Wiegand, 2018) helps to implement sustainable, cross-departmental digital solutions (E6, E12, E16). Consequently, the majority of experts argue that lean administration and digitalization have to be advanced in parallel instead of sequentially. Often both rely on similar organizational conditions and requirements, or have to overcome comparable barriers and hurdles. In the following, the influence of lean administration on digitalization and vice versa is observed.

Lean Administration offers appropriate tools and measures to identify and eliminate non-value adding activities. In this context, maturity levels can be assessed for existing processes. The digitalisation of problematic, unstable processes should be avoided in order to avoid digitization of waste and the risk that an unnecessarily large amount of resources will be tied up in the implementation process, making it difficult to improve the processes later (Brenner, 2018) (Monteiro, et al., 2015) (Pekarčíková, et al., 2019). In particular, digitization cannot create stability for these processes, which builds the basis for high quality, cost cuts and improved customer loyalty (E5, E8). Digital solutions open up new possibilities for avoiding waste, though. A high degree of digitization and automation in processes simplifies and streamlines processes, "freeing up time for employees to participate in the lean transformation" (E4). On the other hand, a radical replacement of existing processes with more efficient and effective digital processes can be achieved. In any case, the newly created digital processes must be assessed with regard to their potential for improvement and further optimized with the help of the lean administration tools (E17). In this context, existing and new digital solutions offer further improvements for and the potential to replace elements of existing processes. This is emphasised by the lean principle to avoid waste. Consequently, process have to continually be assessed, optimized and further improved by the implementation of digital solutions and lean tools on the basis of digital gather data. This is a loop that takes the reduction of waste to a new level, with digitalization providing the basis for real time self-optimization. However, pure process improvements are not at the core of the lean and digital transformation in offices. Both put customers in focus, enhance and expedite services and facilitate employees to gain more time for their customers. This is what drives or "should drive [our] transformation" (E13).

Although lean administration is rather a total perspective than a simple toolbox (Womack & Jones, 1996), most focus on single tools when applying the lean philosophy to offices (Schuh, et al., 2012). Rather than focusing on the philosophy, many focus too much on tools and pursue a goal of waste reduction instead of customer value. In consequence improvements are incremental leading to disappointing results and a symptom of lean fatigue. The exact same is about to happen with digitalisation (E6). Both approaches require vertically – reflecting the organizational hierarchy – and horizontally – reflecting the value stream orientation – well designed targets to guarantee a successful implementation (E3, E16). In this context digitalization benefits from the lean approach that puts customer value in the focus and emphasize the holistic approach to value-stream transformation. A local implementation of digital gadgets rarely leads to improvements on enterprise level and often cause frustration for employees due to a lack of maturity or absent simplifications with regard to the entire process (E7). The support and improvement of existing value creation process by the adaption of new technologies as the centre of digitalization efforts often falls victim to the strife of implementing state-of-the-art technologies. Lean builds on clearly formulated expectations addressing customer value and managements vision that builds on cross-functional acceptance. Thus, it helps to address the problems at its core and supports to define a problem-related approach on digitalization with the specific set of employees (E2, E9, E15). In reverse, digitalization as a now recognized comprehensive approach, that is often seen as part of corporate strategy, helps to set the ground for lean administration. In the course of digitization efforts, a deeper understanding of the need for a structured and comprehensive digital strategy was generated and superseded workplace-specific introduction of digital gadgets. This learning process became an eye-opener for those responsible. It helped to realise that lean is not about methods and tools only, but about culture, leadership and collaboration. This mindset nurtures organizational culture in times of digital transformational changes (E13, E18).

The Toyota Production System, from which the Lean Management approach was derived, states that processes have priority over technologies (Foth, 2016) and only reliable, extensively tested technologies should be used (Liker, 2013). However, this neglects the human factor that plays a highly important role. User behaviour and acceptance is much more decisive than an extensive technical examination of the technologies used. New digital technology can only contribute to process improvement and the fulfilment of customer requirements, if they are understood, accepted and used in an efficient way by employees. This applies equally to the implementation of lean methods. Often to much mechanical effort is made to adopt technologies and proven concepts. However, transformation will never work by hard and fast rules (E13). Thus, it is crucial to develop an awareness for the lean and digital transformation. It is particularly important to ensure that organisational conditions allow for the desired changes. An early integration of workers and actively participating employees are an essential element to cope with existing resistance (E11, E14). Digitalization can help to increase transparency by high-quality, up-to-date data. In particular, in an office setting where it is hard to grasp the effects of lean tools, for example (E7, E9). Lean administration contributes by simplifying this data collection. Finally yet importantly, both approaches require that the change is supported and exemplified by managers. No matter which approach is implemented first - if it is done sequentially - the organizational preconditions for a sustainable implementation of lean administration and digitalization are very similar. Thus, synergies exist and should be exploited.

5. Conclusion

Digitalization makes a key contribution to the sustainable implementation of lean administration. Just like lean administration supports digitalization. In Figure 1 most companies are situated along a diagonal line that illustrates a positive correlation between lean administration and digitalization. A vertical intercept of approximately 2.5 proposes that digital maturity is a prerequisite for lean administration. However, further development of both should ideally be a parallel process, rather than a sequential one. Interpreting the shift one has to keep in mind that although lean management is well established in production it has been neglected within an administrative setting in the past. Most approaches to increase efficiency in an office are to be attributed to the introduction of individual digital technologies. Experts agree that the lack of success of these work-place oriented measures are due to a lack of structure and a missing comprehensive approach. A circular relationship between lean administration and digitization is regarded as a suitable starting point to address this difficulties. As a starting point company's have to focus on customers, clearly defining customer-value-adding targets of lean and digital efforts and in a second step aligning these with the corporate strategy. Finally, core processes are mapped out to reveal inefficiencies and complexities to be addressed. An already optimized process can be further improved and made more efficient with digital innovations. The transparency gained also increases the acceptance of the measures. In this context, digital technologies often open up new ways to improve performance, radically replacing existing processes.

With regard to the implementation, both build on similar organizational conditions. Rather than either of both being a prerequisite for the other, a symbiotic relationship is attested. A parallel approach of implementation helps to overcome difficulties and to exploit synergies. Successful companies carefully plan both within a comprehensive strategy to design efforts of substantial value, rather than overhasty shooting for stars. In order to combine both approaches in a meaningful way, the focus must be placed on the customer as well as the employees working with the digitized and optimized processes, daily. The link in this relationship are organizational requirements and culture. These findings should be taken into account when building models and frameworks for lean and digital transformations in an office setting.

References

Allweyer, T., 2016. BPMN 2.0. Introduction to the Standard for Business Process Modeling. Norderstedt: Books on Demand GmbH.

Antonioni, D., Cunningham, I. & Dittmann, P., 2005. The new improvement frontier: Developing Lean administration. *Strategic Direction,* 21(11), pp. 33-35.

Asbach, M. & Kamp, F., 2014. Orientierung der Unternehmenssteuerung an Lean-Management-Grundsaetzen. In: F. Keuper & R. Sauter, eds. *Unternehmenssteuerung in der produzierenden Industrie. Konzepte und Best Practices.* Wiesbaden : Springer Verlag, pp. 287-300.

Bertagnolli, F., 2018. *Lean Management. Einfuehrung und Vertiefung in die japanische Management-Philosophie.* Wiesbaden: Springer Gabler.

Bhasin & Burcher, 2006. Lean viewed as a philosophy. *Journal of Manufacturing Technology Management,* 17(1), pp. 56-72.

Bock, M., 1992. Das halbstrukturierte-leitfadenorientierte Tiefeninterview. Theorie und Praxis der Metho-de am Beispiel von Paarinterviews. In: J. Hoffmeyer-Zlotnik, ed. *Analyse verbaler Daten. Über den Umgang mit qualitativen Daten.* Opladen: s.n., pp. 90-109.

Brenner, J., 2018. *Lean Administration: Verschwendung in Büros erkennen, analysieren und beseitigen.* Münche: Carl Hanser Verlag.

Brill, M. et al., 2001. *Disproving Widespread Myths About Workplace Design.* Jasper: Kimball International.

Chanias, S., Meyers, M. & Hess, T., 2019. Digital transformation strategy making in pre-digital organizations: The case of a financial services provider. *The Journal of Strategic Information Systems,* 28(1), pp. 17-33.

Chen, J. C. &. C. R. A., 2012. Value Stream Management for Lean Office –A Case Study. *American Journal of Industrial and Business Management,* 2(2), pp. 17-29.

Danielsson, C., 2013. An explorative review of the Lean office concept. *Journal of Corporate Real Estate,* 15(3/4), pp. 167-180.

Evans, N., 2017. *Mastering Digital Business: How powerful combinations of disruptive technologies are enabling the next wave of digital transformation.* Swindon ed. s.l.:BSC Learning & Development Ltd.

Fersht, P. et al., 2018. *Accenture's Intelligent Operations research: the Future Belongs to Intelligent operations,* s.l.: HfS Research.

Fichter, A., 2019. Change Management Towards Digitalization And Innovation. *Procceedings of 2019 17th International Conference on Emerging eLearning Technologies and Applications (ICETA), Smary Smokovec,* pp. 185-190.

Foth, E., 2016. *Erfolgsfaktoren für eine digitale Zukunft.* Gerlingen: Springer Vieweg.

Friedrichs, J., 1990. *Methoden empirischer Sozialforschung.* Opladen: s.n.

Glaser, J. & Laudel, G., 2010. *Experteninterviews und qualitative Inhaltsanalyse als Instrumente rekonstruierender Untersuchungen.* 4. ed. Wiesbaden: VS Verlag.

Gorecki, P. & Pautsch, P., 2013. *Lean Management. Auf den Spuren des Erfolges der Managementphilosophie von Toyota und Co.* München: Hanser Verlag.

Heemsbergen, L., 2016. Digital age| from radical transparency to radi-cal disclosure: reconfiguring (in) voluntary transparency through the management of visibilities. *International Journal Communication,* 10(1), pp. 138-151.

Kaiser, R., 2014. *Qualitative Experteninterviews: Konzeptionelle Grundlagen und praktische Durchfuehrung.* Wiesbaden: Springer Fachmedien.

Keunecke, S., 2005. Qualitatives Interview. In: L. Mikos & C. Wegener, eds. *Qualitative Medienforschung. Ein Handbuch.* s.l.:s.n., p. 254–267.

Klammer, B., 2005. *Empirische Sozialforschung: Eine Einführung für Kommunikationswissenschaftler und Journalisten.* s.l.:UTB GmbH.

Klimmer, M. & Selonke, J., 2017. *#Digital Leadership.* 1 ed. Berlin Heidelberg: Springer Verlag.

Ko, R., Lee, S. & Lee, E. W., 2009. Business process management (BPM) standards. A survey. *Business Process Management Journal Vol (15),* pp. 744-791.

Kromery, H., 2002. *Empirische Sozialforschung - Modelle und Methoden der standardisierten Datenerhebung und Datenauswertung.* 10. ed. Heidelberg: Springer .

Larsson, L., 2008. *Lean administration.* Malmö: Liber.

Latos, B., Harlacher, M., Przybysz, P. & Muetze-Niewöhner, S., 2017. Transformation of working environments through digitalization: Exploration and systematization of complexity drivers. *IEEE International Conference on Industrial Engineering and Engineering Management (IEEM), Singapore,* pp. 1084-1088.

Liker, J., 2013. *Der Toyota Weg.* München: Finanzbuch Verlag.

Lorenz, R. et al., 2019. Lean and Digitalization—Contradictions or Complements?. In: F. Ameri, K. Stecke, G. Cieminski & D. Kiritsis, eds. *Advances in Production Management Systems. Production Management for the Factory of the Future.* Cham: Springer, pp. 77-84.

Magenheimer, K., Reinhart, G. & Schutte, C., 2014. Lean management in indirect business areas. Modeling, analysis, and evaluation of waste. *Production Engineering,* pp. 143-152.

Majchrzak, A., Markus, M. & Wareham, J., 2016. Designing for digital transformation: lessons for information systems research from the study of ICT and societal challenges. *MIS Quartarly,* 40(2), pp. 267-277.

Mayer, H., 2012. *Interview und schriftliche Befragung: Grundlagen und Methoden empirischer Sozialforschung: Grundlagen und Methoden empirischer Sozialforschung.* 6. ed. Hamburg: Oldenburg Verlag.

Meuser, M. & Nagel, U., 1994. Expertenwissen und Experteninterview. In: R. Hitzler, A. Honer & C. Maeder, eds. *Expertenwissen. Die institutionelle Kompetenz zur Konstruktion von Wirklichkeit.* Opladen: Westdeutscher Verlag, pp. 180-192.

Meuser, M. & Nagel, U., 2009. Das Experteninterview: Konzeptionelle Grundlagen und methodische Anlagen.. In: S. Pickel, G. Pickel, H. Lauth & D. Jahn, eds. *Methoden der vergleichenden Politik- und Sozialwissenschaft: Neue Entwicklungen.* Wiesbaden: GWV Fachverlag GmbH.

Misoch, S., 2014. *Qualitative Interviews.* Berlin, Muenchen, Bosten: Walter de Gruyter GmbH & Co. KG.

Monteiro, M., Pacheco, C., Dinis-Carvalho, J. & Paiva, F., 2015. Implementing Lean Office: A successful Case in Public Sector. *FME Transactions,* 43(1), pp. 303-310.

Nadarajah, D., Latifah, S. A. & Kadir, S., 2014. A review of the importance of business process management in achieving sustainable competitive advantage. *The TQM Journal Vol (26),* pp. 522-531.

Ohno, T., 2013. *Das Toyota-Produktionssystem.* 3. ed. Frankfurt/New York: Campus Verlag.

Pekarčíková, M., Trebuňa, P. & Kliment, M., 2019. DIGITALIZATION EFFECTS ON THE USABILITY OF LEAN TOOLS. *International Scientific Journal about Logistics,* 6(1), pp. 9-13.

Peppard, J., 2016. A Tool for Balancing Your Comapny's Digital Investments. *Havard Business Review.*

Pfadenhauer, M., 2005. *Professionelles Handeln.* Wiesbaden, Germany: VS Verlag fur Solzialwissenschaften.

Pfadenhauer, M., 2009. Das Experteninterview. Ein Gespraech auf gleicher Augenhoehe. In: R. Buber & H. Holzmueller, eds. *Qualitative Marktforschung.* Wiesbaden: Gabler Verlag.

Schneider, M., 2017. "Lean" trifft auf "Industrie 4.0". *Logisitik für Unternehmen,* Volume 07, pp. 36-38.

Schnell, R., Hill, P. & Esser, E., 2011. *Methoden der Sozialforschung.* 9. ed. München: Oldenburg Verlag.

Schuh, G., Potente, .., Jasinski, T. & Nuyken, T., 2013. Lean Administration - potentials, Content and Implementation. *International Journal of Businiess and Managment Studies,* 5(2), pp. 85-94.

Schuh, G., Potente, T., Bachmann, F. & Nuyken, T., 2012. Lean Management in indirekten Bereichen - Methodenunterstützter Wandel der Unternehmenskultur. *Zeitschrift für wirtschaftlichen Fabrikbetrieb,* 107(6).

Schwarzmüller, T., Brosi, P. & Welpe, I., 2015. Führung im digitalen Zeitalter. In: S. G. Verlag, ed. *Digitales Neuland.* Wiesbaden: T. Becker; C. Knop, pp. 155-166.

Seele, P. & Lock, I., 2017. The game-changing potential of digitalization for sustainability: possibilities, perils, and pathways. *Sustainable Science,* Volume 12, pp. 183-185.

Selander, L. & Jarvenpaa, S., 2016. Digital action repertoires and transforming a social movement organization. *MIS Quartarly,* 40(2), pp. 331-352.

Singh, A. & Hess, T., 2017. How Chief Digital Officers Promote the Digital Transformation of their Companies. *MIS Quarterly Executive,* 16(1), pp. 1-17.

Svahn, F., Mathiassen, L. & Lindgren, R., 2017. Embracing digital innovation in incumbent firms: how Volvo Cars managed competing concerns. *MIS Quartarly,* 41(1), pp. 239-253.

Tapping, D. & Shuker, T., 2003. *Value Stream Management for the Lean Office: Eight Steps to Planning, Mapping, and Sustaining Lean Improvements in Administrative Areas,.* New York: Productivity Press.

Tautrim, J., 2014. *Lean Administration. Taschenbuch/Beraterleitfaden. Wesentliche Konzepte und Werkzeuge für mehr Effizienz in der Verwaltung.* Berlin: epubli.

Tsipoulanidis, A., 2017. Leandustry 4.0 - The efficient way from company to costumer at times of the digital transformation; How Lean Thinking is leading to smart Supply Chain Management and Operational Excellence. In: *5th International Conference on Contemporary Marketing Issues.* Thessaloniki, Greece: s.n.

Vey, K., Fandel-Meyer, T., Zipp, J. S. & Schneider, C., 2017. Learning & Development in Times of Digital Transformation: Facilitating a Culture of Change and Innovation. *International Journal of Advanced Corporate Learning,* 10(1), pp. 22-32.

Westkämper, E. et al., 2011. *Lean Office 2010 - Erfolgsfaktoren der Lean-Iplementierung in indrekten Unternehmensbereichen,* Stuttgart: Publica IPA.

Wiegand, B., 2018. *Der Weg aus der Digitalisierungsfalle Mit Lean Management erfolgreich in die Industrie 4.0.* Wiesbaden: Springer Gabler Verlag.

Womack, J. & Jones, D., 1996. *Lean Thinking.* New York: Simon & Schuster.

Womack, J. & Jones, D., 1996. *Lean Thinking: Banish Waste and Create Wealth in Your Corporation.* New York: Simon & Schuster.

Womack, J., Jones, D. & Roos, D., 1990. *The machine that changed the world: the story of lean production - Toyota's secret weapon in the global car wars that is revolutionizing world industry.* London: Simon & Schuster.

Biographies