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Document Version

Final published version

Published in:

Proceedings of the 52nd Hawaii International Conference on System Sciences

DOI:

[10125/60331](https://doi.org/10.1256/60331)

Publication date:

2019

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Citation for published version (APA):

Pflaum, A., Bodendorf, F., Prockl, G., & Chen, H. (2019). The Digital Supply Chain of the Future: From Drivers to Technologies and Applications. In *Proceedings of the 52nd Hawaii International Conference on System Sciences* (pp. 5153-5154). Hawaii International Conference on System Sciences (HICSS). Proceedings of the Annual Hawaii International Conference on System Sciences <https://doi.org/10.1256/60331>

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Download date: 20. Oct. 2021



The Digital Supply Chain of the Future: From Drivers to Technologies and Applications

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Abstract

The following paper describes the mini-track on the digital supply chain of the future. The mini-track addresses research questions concerning drivers and challenges of digital transformation, relevant basic technologies, applications and smart services, digital cloud platforms, cultural and organizational change etc. After a short introduction to the topic the different contributions are addressed, described and integrated into an overall context. At the end of our paper we add some recommendations concerning future research on the digital transformation of firms, business models and supply chains.

1. Introduction

The increasing digitalization of economic processes is fundamentally changing business models, companies and entire industries. Digital ecosystems are emerging. Smart products and related services in particular are expected to change competition between companies and supply chains significantly. However, the development of smart services based on smart products is always associated with complementary innovations such as cloud and mobile computing, blockchain, data analytics and artificial intelligence. Important is the fact that the real innovation power does not lie in the individual technology but in its combination with other technologies. Smart products and related services can be used, on the one hand, to optimize internal company processes and, on the other hand, to generate additional revenue for the company at the interface to the customer. Over time and with more and more smart products and services realized, the traditional product-oriented companies of today will be transformed into data-driven companies of tomorrow. New models, methods and tools are needed in order to realize an effective and efficient transformation process. Our minitrack on the digital supply chain of the future wants to contribute here. In the following chapter, the

individual presentations of the minitrack are briefly outlined. At the end of this contribution we provide recommendations concerning future research topics.

2. Contributions

The first of the three articles deals with maturity models for the implementation of the Industry 4.0 concept in companies. Such models are usually used to determine a company's position in the transformation process in a first step and to derive recommendations for action in a second one. In recent years, a number of maturity models have been developed by universities, colleges and consulting firms. The extent to which these models are actually used in practice has not yet been clarified. This is precisely the question that the contribution addresses. In their research work, the authors conclude that the degree of utilization of the existing models is comparatively low. Lack of usability seems to be the reason. Apparently, the creators of the different models have not yet succeeded in translating their abstract concepts into practicable tools. The authors try to understand the purpose behind using maturity models in practice, to identify concrete practical requirements and to deliver recommendations for future research and development of the existing maturity models [1].

Closely linked to maturity models for digitalization is scientific research on the main drivers and obstacles of Industry 4.0 implementations. The second article presented during the minitrack deals with this question more intensively. The authors develop a theoretical framework, which shows connections between drivers and obstacles, the degree of digital maturity and the practical implementation itself. In order to answer their research question, they formulate and test 5 different hypotheses using a questionnaire-based approach. In total 308 small and medium-sized enterprises located in Denmark have been contacted and asked to fill out the questionnaire. Based on the feedback the authors can prove that perceived drivers lead to higher industry 4.0 readiness and consequently to a more thorough

practical implementation of the concept. On the other hand, obstacles seem to have a negative impact on the digital maturity level, but do not have a negative influence on the practical implementation [2].

Digital transformation doesn't only affect industrial production but also logistics and retail processes. In the retail sector, the existing traditional business models of small and medium sized companies are still heavily challenged by large supermarket chains, by megastores and e-commerce. New information and communication technologies like mobile apps, data analytics etc. offer the possibility to react and to reposition small and medium sized stores successfully in the increasingly digitized business environment. Smart retail services delivering added-value to the customer have to be developed and implemented. Against this background, the third article examines the current state of digitalization in the Indian retail sector using a qualitative approach. The study clarifies that small and medium sized Indian retail companies barely adopt modern information and communication technologies on the supply and the customer side. Inefficient processes, inadequate availability and reliability of telecommunication and information infrastructures, heavy dependence on cash- and credit-based low-value transactions and high-cost digitalization processes in combination with limited financial possibilities of retail companies are identified as the main problems. The authors point out that the prerequisites for the digitalization of the Indian retail sector still have to be created [3].

3. Conclusion

In total, the contributions described in the last chapter provide answers to relevant research questions. The determination of the position of a company within a maturity model is the prerequisite for determining the next steps in the transformation process. The same applies to comprehensive knowledge concerning regional and framework conditions as well as industry-specific peculiarities. Drivers and barriers have to be known in order to use catalysts correctly and to avoid friction losses along the process. In addition, there are other topics that have to be addressed in future research on data-driven companies and supply chains. The most important topics from the authors' point of view are listed below:

Smart products and their impact on supply chains; location-based services for suppliers, manufacturers, customers; tracking and tracing technologies and applications; application of blockchain technology in supply chain management; autonomous transportation technologies (drones, self-driving vehicles etc.); software and IT for the supply chain of the future; smart factories and smart supply processes; analytics of sensor and social media data in manufacturing and logistics; data-driven applications to support the realization of agile supply chains innovative smart services for the customer based on smart products; mobile solutions for white and blue collar workers along the supply chain; impacts of digitization on decision behavior in industrial companies; effects of product virtualization on supply chain management; business models based on smart object technologies in supply chains; methodologies, models, frameworks for the digital transformation in manufacturing; regulatory, privacy, and security issues with smart products and services; analysis of digitization strategies in different industries; effects of digitalization on cooperation behavior; relationship between corporate culture and digital transformation; impacts of digitization on organizational, structural and process design; technological trends related to Cyber-Physical Systems; complementary innovations for and architectures of smart product based solutions; impacts of digitization on product and service offerings; relationship between digitization and value creation; impacts of digitization on decision-making structures; impacts of smart products and services on consumer behaviors; cross-country analysis of digitization of products and services.

4. References

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