

# Introduction to the Minitrack on The Digital Supply Chain of the Future

## Applications, Implications, Business Models

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

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### Abstract

*The following contribution provides an overview to the minitrack 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 platforms, cultural and organizational change etc. After a short introduction the different papers of the mini track are described and embedded into an overall context. Towards the end of our contribution we add some recommendations concerning future research on digitalization of firms, business models and supply chains.*

### 1. Introduction

Global supply chains have to cope with a broad variety of external disturbances. In the still ongoing Covid 19 pandemic lots of companies report shortage of materials and supply goods. Additionally, sustainability seems to become an important key for future success. Higher supply chain visibility, more flexibility, higher speed and agility are needed urgently to respond to these challenging developments and new technologies such as the IoT, cyber-physical systems, autonomous and collaborative robots, automated guided vehicles and drones, cloud and mobile computing, data analytics and machine learning, artificial intelligence, digital cloud platforms and blockchain as well as the virtualization of the physical world, digital twins and 3D printing can help to master the aforementioned challenges. They are increasingly being used in practice. Eventually the implementation of these technologies leads to a comprehensive digital transformation of companies, supply chains and industry structures. Data has to be understood as a new source of value creation. From our point of view, the technologies mentioned above in combination with data-driven services pave the way for a paradigm shift in supply chain management (SCM),

leading to more self-organizing and self-optimizing ecosystems. In our minitrack we try to understand how digital transformation effects traditional product-oriented supply chains and the corresponding management activities and thus leads to the digital supply chain of tomorrow. Digitalization in general is expected to play an increasingly important role for global supply chains. The reasons for this include: the shift in values from the physical artefact to the data created by smart products, the emerging importance of digital platforms, services and business ecosystems, the displacement of industry borders, the radical change of competitive structures and power distribution, the transformation of business models and, at the end of the day, the symptomatic creative destruction of established structures and behavioral patterns.

In the next section, the six individual presentations of the minitrack on the digital supply chain of the future are briefly outlined. At the end of this contribution, we provide additional recommendations concerning future research topics.

### 2. Contributions

The first paper is dealing with blockchains in the domain of supply chains and its authors investigate approaches to conceptualize value that participation in a blockchain initiative may imply for the single actors within supply chains. Next to the value provided by a task-technology fit the authors propose also a network and relationship value as equally important for companies when they consider participation in an industry blockchain. Beyond task technology fit model, network effects, and structural embeddedness are introduced and combined as theoretical lenses to explore the value that leads to appropriation and blockchain adoption. The lenses are applied to two cases, one from the gemstone industry and another from the container shipping industry. The research proposes task technology fit as a prerequisite but also shows how beyond that, network fit, autonomy, and equivalence of

the organizations may contribute to the successful adoption of blockchains. [1].

Logistics Services are relevant elements in supply chains and addressed by the second and third paper of the minitrack. The second paper deals with the specific topic of sourcing logistics services via digital platforms. The authors focus hereby on the asymmetrical distribution of information between carrier and shipper, which can lead to suboptimal results in the procurement process for the latter. Based on a design science approach, they report about design and implementation of a decentralized logistics services procurement system and evaluate in this context the potential of such applications to provide a more transparent and efficient way of procurement of logistics services. Beyond that, they try to generalize the gained insights from the development of such a decentralized logistics services procurement system towards a set of nascent design principles guiding the elaboration of decentralized procurement mechanisms. [2].

The third paper points at data as a valuable asset for logistics companies. Its authors identify in particular publicly or commercially available Application Programming Interfaces API as interesting access points to relevant data that may be applied in a more narrow view for tracking of transport status, route optimization, or monitoring of products and in a wider view to develop new business models providing more transparent supply chains. In principle, API would allow an automated and thus efficient access to such data sources via machine-to-machine interfaces. But this requires a better understanding of the potentially relevant contents that are hidden in the vast and at best semi structured API landscape. Based on an inductive analysis of three API examples the authors thus search for a contribution in providing a taxonomy of API services in logistics. [3].

The fourth paper is also dealing with data; but takes it from a rather different viewpoint. Its authors investigate motivation in the context of providing or sharing data for research purposes. They present a case of acquiring data with a crowdsourcing approach from Supply Chain Frontline Workers, in this case Truck Drivers. Reflecting on social identity theory there is then in particular a focus on the question whether there is a difference in the engagement of these intrinsically motivated volunteers when they are approached by beneficiaries that are showing either homogeneous or heterogeneous characteristics to themselves. Regarding heterogeneity, the authors refer to previous research that has presented anecdotal evidence suggesting strong opinions of truck drivers against foreigners. This apparent heterogeneity of local vs. foreign truck drivers is put into some contrast to a group homogeneity based on the truck driver profession.[4].

The fifth paper is moving from data towards knowledge and from logistic services to manufacturers. It investigates the impact that knowledge, in particular embedded in networks, has on the maturity of additive manufacturing and so also on the competitiveness of related manufacturing processes in many industries. The authors develop a theoretical model that links competitive advantages to maturity in additive manufacturing and knowledge acquired in networks. This model is tested with data from a survey across small and medium sized Danish manufacturers. Beyond that, the findings on these tested relationships allow additionally also a differentiation into different types of knowledge networks with different effects on maturity and competitive advantages from additive manufacturing. [5]

Finally, the sixth paper is taking a more comprehensive view on supply chain management and positions itself in the interface of digital supply chain management and sustainable supply chain management SSCM. Practices to enhance economic, environment and social performance, i.e. sustainability by means of information and communication technologies (ICT) are intensively discussed in the recent years and their importance seems to be recognized. Nevertheless, the authors still identify a deficit in understanding the factors that ultimately lead to the adoption of such practices by the organizations within the supply chains. Based on multiply case studies in the Australian food industry they investigate in particular the factors affecting the adoption of ICT-enabled SSCM practices and sort them into different levels such as national, industry, supply chain, and organizational level. [6]

### 3. Conclusion

In summary, the different contributions address important research topics. Since blockchain technology becomes more and more mature it is important to foster a comprehensive discussion concerning its value in supply chain settings. The effects of digital platforms on supply chains and supply chain management are still not understood and need more research activities as well. In addition, data is at the heart of digital transformation and new ways of making it available for supply chain actors need to be developed. Truck drivers have a similar importance. They are becoming more and more a rare resource in supply chains and merit more attention in the scientific world. 3D printing on the other side might be an important means to turn traditional physical supply chains into their virtual pendant and relieve us from the necessity of physical transport. Finally, sustainable supply chains depend heavily on supply chain visibility and research on the link between these two concepts is also needed.

In addition, there are more topics that have to be addressed in future research on data-driven companies and supply chains. The following list contains some of these, in our view, highly important topics: Analysis of drivers of digital transformation of supply chains; supply structures for smart products and services; visibility and transparency through the Internet of Things; improved planning and forecasting through data analytics; decision making based on artificial intelligence; virtualization of supply structures; robots, cobots and other technology drivers for process automation; the impact of digitalization on business performance and industries; changes in the understanding of the terms Supply Chain, SCM, ecosystem; effects of digitalization on the target system of SCM; models, methods, tools and legal frameworks for the digitalization of companies and supply chains; barriers and challenges for the digitalization of supply chains; relationship between data security and digitalization of supply chains; requirements for the digitization of supply chains in the extended enterprise. A more structured research agenda on the digital supply chain of the future can also be found in Hofmann et al. [7].

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