Network Value Co-Creation Goes Digital – a Case Study

Completed Research

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Abstract

We present a single embedded case study of a textile value co-creation (VCC) network, investigating the role of information technology (IT) for this process-oriented and knowledge-driven domain. The research question how companies should adapt their processes to facilitate an overarching VCC process in their network and how IT can be leveraged to support these adaptations is addressed. We formulate four propositions to facilitate VCC in the examined network and derive concrete recommendations for adaptations in our case. The case study leads to the insights: (1) Service innovation in the textile industry is the key to worldwide competitive advantages for the German textile industry, (2) knowledge and expertise are the most valuable resources in the network, (3) communication and knowledge-sharing between network actors is key to network success, and (4) heterogeneous and isolated IT landscapes within the network hinder efficiency and innovation.

Keywords

Value co-creation, case study, small and medium enterprise, network, service-dominant logic.

Introduction

Nowadays, companies find themselves in the area of tension of various challenges such as the advancing digital transformation (Legner et al. 2017), the customer's desire to participate in the product design (Mahr et al. 2014), and the shift toward value creation organized in networks (Altuntas Vural 2017). The textile industry is an example of a low tech, long tradition, and labor intense sector consisting of small and medium enterprises (SME) typically organized in local networks (Hodges and Link 2018). Thereby, this sector serves as a good example for SME in value creation networks, which are usually not that advanced in their digital transformation. Due to globalization and the resulting competitive pressure, developed countries have shifted their textile industries towards service-centeredness and knowledge-intense work, especially regarding technical textiles (Jones and Hayes 2004). In the development of technical textiles, the focus lies on innovations for the functions performed by these textiles and therefore the produced textiles are carriers of services such as soil stabilization via geotextiles or radiation- and heat-protection (Bryson and Ronayne 2014). By specializing in service innovation and the development of new textile solutions, the companies need to integrate the customer and partners into value creation to guarantee a satisfactory solution. Although the textile industry of developed countries was able to gain a competitive advantage by focusing on innovation and customer integration, they still need to adapt to the changing market. In order to survive in the competitive environment, value co-creation and digital transformation must be addressed in addition to the already discernible changes. Transitioning from a labor-intensive to a knowledge-intensive low-tech sector and thus facing the problem of constantly needing to innovate is not unique to the textile industry, whereby this discussion may be interesting for other industries as well.

In our study, we want to focus on value creation in SME networks in an innovation- and knowledge-intense sector. As a theoretical foundation and lens, we use Lusch and Nambisan's (2015) framework for service innovation. It is based on the service-dominant logic (SDL) and focuses on the exchange of services in a service ecosystem (Lusch and Nambisan 2015). With this theoretical lens, the SME networks in the textile

industry can be described as actor-to-actor (A2A) networks exchanging services. The service innovation framework is applicable for services as well as physical products (by interpreting the production flow line as a supply chain and thereby as a service delivery). By abstracting from the complex market situation and using the theoretical lens, we focus directly on the facilitation of value co-creation (VCC) and digital support of it. Thereby our research objective is to foster the digital transformation of SME which already have moved or are moving their businesses towards knowledge-, service-, and network-centeredness. We conduct a single embedded case study of a textile VCC network to answer the related research question: How should companies adapt their processes to facilitate an overarching VCC process in their network and how can information technology (IT) be leveraged to support these adaptations? By using a characteristic case for the whole textile industry, the results can serve as indicators for other cases in the same industry and can inspire other industries as well.

The remainder of the paper is organized as follows: After we have described the theoretical foundations of our research, the research design is outlined and the four propositions are derived. We present the results of the case study in the subsequent section and discuss the propositions in the light of a concrete VCC network, serving as the starting point for general recommendations for similar settings. The paper concludes with a short summary and outlook to further research.

Theoretical Foundations

The theoretical considerations of our case study are based on the SDL and on VCC. In 2004, Vargo and Lusch published the paper "Evolving to a new dominant logic for marketing" by questioning and criticizing the goods-dominant logic (Vargo and Lusch 2004). They combine various considerations and concepts to create a new comprehensive service-oriented perspective, called SDL. SDL is not a single model or a loose theory, but rather a fundamental shift in worldview that has lastingly changed the understanding of marketing and value creation processes. The SDL has served as the theoretical foundation for a broad spectrum of further publications, which apply the concept in various areas. One example is the tripartite framework of service innovation by (Lusch and Nambisan 2015), where innovative activity, in the form of VCC, takes place in so-called service ecosystems, in which resources are exchanged and integrated via service platforms. A service ecosystem is comprised of an A2A network and deals with topics like structure, common world view, and coordination of service exchange. A service platform is a modular structure made from tangible and intangible resources, while VCC is a process of interactive resource integration. According to (Constantin and Lusch 1994), there are two kinds of resource types: operand and operant. While operand resources are resources in the sense of physical nature, such as mineral resources, machines, or capital, operant resources are typically intangible, informational, relational, or organizational and represent human knowledge or abilities (Hunt 2004). The SDL considers the latter as the basis for competitive advantage and strategic benefit of companies (Vargo and Lusch 2016). In the SDL not only the competences of an actor are often operant resources, but also the organizational processes (Vargo and Lusch 2004). This is particularly true for process industries, like the textile or chemistry industry, where the production knowledge is not about modular products but about procedures and techniques (Noroozi and Wikner 2017). In the paper at hand, the production knowledge in the textile industry constitutes an example of these operant resources. Combining SDL with the supply chain management perspective has been discussed in recent years, as there is also a shift towards knowledge centeredness in this research area (Randall et al. 2014). By interpreting the supply chain as well as internal production flow lines as service delivery/exchange, the production of tangible and intangible products can be examined through the SDL lens. In company networks, these companies exchange service directly (via services) or indirectly (via tangible goods) (Vargo and Lusch 2016). Collaboration with partners and competitors is becoming increasingly important for companies in order to create or maintain competitive advantages (Sawhney et al. 2005). Value creation has changed from a company-oriented to a customer-oriented perspective, in which the customer (beneficiary) is involved in the process of value creation and is therefore referred to as VCC (Prahalad and Ramaswamy 2004). One reason for this is seen in the fact that today's customers have easy access to information, are therefore more informed, and can change their passive role to an active role in value creation and become innovators (Prahalad and Ramaswamy 2004; Thomke and von Hippel 2002). In addition, the need for companies to continuously work on innovations in order to succeed in competition is increasing and the knowledge of customers is one of the most important resources in the innovation process that leads to market success (Mahr et al. 2014). VCC is a dyadic process at the intersection of company and customer, where integrated joint problem solving takes place to create value (Aarikka-

Stenroos and Jaakkola 2012). From a SDL-perspective, the VCC takes place in an A2A network, where every actor can be principal (consumer) or agent (provider) (Haase and Kleinaltenkamp 2011). The VCC process is thus a process that flows through the entire network and describes how actors create value together. Since it is not easy to observe VCC empirically, the research has used different approaches besides the interpretation of VCC as a process. Among other things VCC can also be explored at the level of actor engagement (Storbacka et al. 2016). As Aarikka-Stenroos and Jaakkola (2012) have stressed, an important part of the VCC process is the organization of the value creation process between the actors and of the resources it contains. In addition, they argue that the transfer of this dyadic concept to networks requires further research.

Research Design

Lusch and Nambisan (2015) suggest a framework for service innovation from a SDL perspective, as mentioned before. The paper at hand builds on this framework to analyze a service ecosystem in the textile industry. Thereby we address a question raised by Lusch and Nambisan (2015, p. 163): "What adaptations do actors need to make in their internal processes to facilitate value cocreation, and how do these processes/mechanisms interact with the digital infrastructure?". We approach our related research question (cf. Introduction) in several steps. In a first step, we draw back on the generic four building blocks described by Prahalad and Ramaswamy (2004) to facilitate VCC. The second step is to extend these assumptions about which factors facilitate VCC by considering a SDL perspective and a process perspective. We formulate four propositions on what adaptations the actors may need to make in their internal processes to facilitate the VCC process in an A2A network. The propositions act as starting points, from which we derive specific adaptations in this paper. We use our propositions to analyze a single embedded case in the next step (cf. Figure 1). This allows us to determine which of the propositions are implemented by the companies in the network and, if some are not, why this is the case. Finally, we can draw implications for the four companies (cf. Table 1) in the network and on a theoretical level.

In the paper at hand, we conduct a contemporary study in the German, Saxonian textile industry to find out how the actors adapt their internal processes to facilitate VCC in their network and how they use IT in this context. According to Yin (2018) a case study is an empirical method, investigating a contemporary phenomenon in depth and within its real-world context, particularly when the boundaries between the phenomenon and the context are not clear (Yin 2018). We choose a single embedded case study design with multiple units of analysis (UA) since the four SME (UA) form a VCC network (the case) we want to examine (cf. Table 1). We argue that a single case study is valid because we have chosen a network as a typical representative of a change in an entire industry (common case), we have chosen an in-depth and long-term examination, and due to the complexity of network research single case studies are often preferable (Halinen and Törnroos 2005). All four companies are highly specialized and have successfully changed their business from low knowledge home-textiles to the niche of technical textile processing. In order to handle individualized customer orders, they build a dynamic A2A network in which they exchange services. The sampling shown in Table 1 was made in a way, that the involved companies represent different stages in the textile value creation or are substitutes for each other in the value creation (they are co-creating technical textiles for the same customer e.g. a car manufacturer, but they are also part of other network constellations serving other industries). This reflects the typical fact that companies in the textile industry have to collaborate in a network and compete at the same time (Hodges and Link 2018).

UA	Role in network	Dependencies and competition
1	Weaving factory	Output of UA 2 can be a substitute for UA 1 output; needs UA 3 or 4 to finish textile
2	Knitting factory	Output of UA 1 can be a substitute for UA 2; needs UA 3 or 4 to finish textile
3	Textile coating	Output of UA 4 can be a substitute for UA 3, but often needs UA 1 or 2 to apply service
4	Textile finishers	Output of UA 3 can be a substitute for UA 4; needs UA 1 or 2 to apply service
Example interaction: Business customer requests new textile development → UA exchange knowledge to design the development process → e.g.: UA2 provides textile carrier (functionality: specific elasticity) → UA4 provides a cleansing service and a heat treatment (functionality: specific elasticity + robustness) → UA3 provides a coating (functionality: specific elasticity + robustness + waterproofness) → the business customer receives the textile carrier (3x500 meters) providing water protection.		

Table 1. UA and Case Definition.

For the data collection we chose an approach with a small number of UA, but a broad spectrum of interaction and analysis over more than 12 months (summer of 2017 till autumn of 2018). This approach

aims to uncover the inner mechanism of a concrete service ecosystem and helps to find out how the processes are adapted and what the role and potential impact of digitization and IT in this service ecosystem is. Five different instruments were used: questionnaires, direct observation, interactive workshops, interviews, and document analysis. The data collection was iterative so that the findings from previous data collection rounds could be integrated into subsequent data collection, as shown in Figure 1. In all data collection rounds, the companies were examined separately. The questionnaire was mainly focusing on the possible IT support, based on functional suggestions by (Hönigsberg et al. 2019). The direct observation took place on the shop floors and actors in the network were subject to the interactive workshops. The fourth round consisted of interviews focusing on the data object flows with their digitization level in the process, as suggested by (Wache et al. 2019). Following the data objects analysis and in the final round, the self-perceived digitization and standardization of the interaction of the whole network were evaluated by the companies. The analysis step is divided into two levels. The first level of analysis is the evaluation, coding, and, triangulation, which was performed during the case study in an iterative way using the results for the next data collection round. The second level of analysis uses the propositions (cf. next section) to discuss the first level results of the case study. All results have been translated from German and have often been consolidated to a general statement for all companies. Furthermore, the UA are not connected with single observations, since that would make them identifiable. In Figure 1 we illustrate our approach to answer our research question, including the proposition construction and the case study design as well as how these two parts are connected.

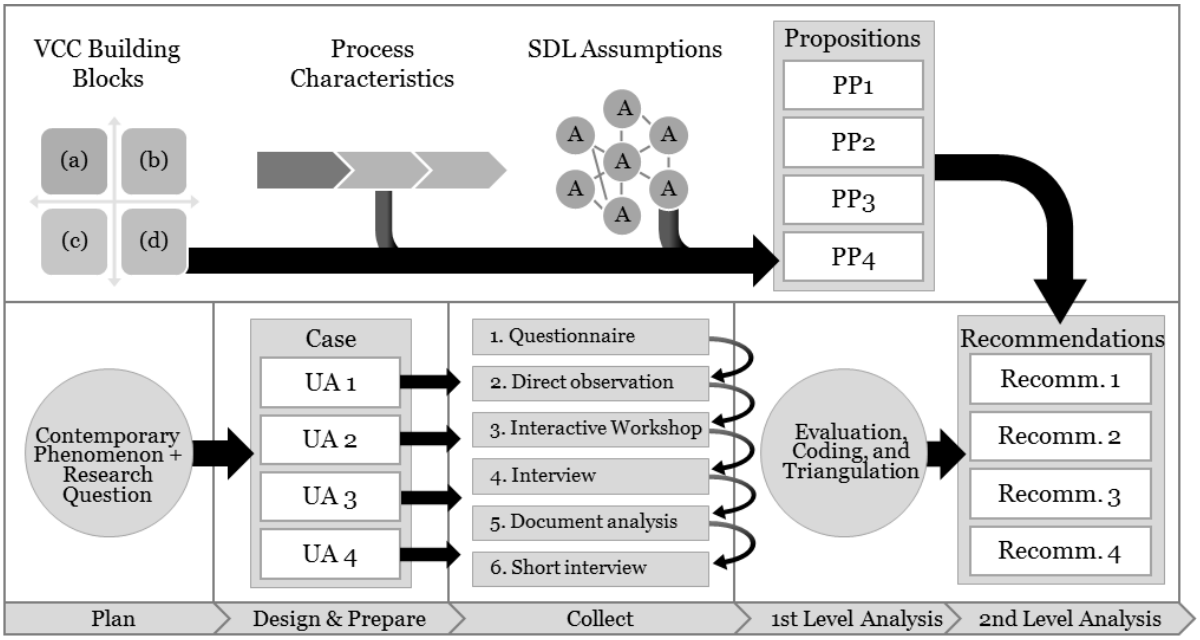

Figure 1. The Case Study Design.

Deriving Propositions to Facilitate Value Co-Creation in Networks

In this section, we describe the underlying propositions, which will be reviewed in the case study at hand. In order to identify concrete adaptation possibilities, we first inspect the aforementioned generic four building blocks by Prahalad and Ramaswamy (2004), which enable companies to better engage customers in collaboration and create value together: (a) dialogue, (b) access, (c) transparency, and (d) risk assessment. (a) Dialogue is about shared learning and communication between equal problem solvers, (b) access is about access to information, knowledge bases and technologies, (c) transparency is about reducing information asymmetry between customer and business, and finally (d) risk assessment is about enabling the customer to assess the personal and social risk associated with a product or service. This underlines the importance of equal communication and the exchange of information and knowledge in the VCC process. In addition, IT plays an important role in facilitating VCC (Di Gangi and Wasko 2009), e.g. the internet as a platform for the interactive integration of customers (Sawhney et al. 2005).

With this foundation of the four building blocks in mind, we will now proceed with the proposition construction, using a process- and a SDL-perspective for facilitating the VCC. First, a process, in general, can be described as events, activities, and choices over time (Langley 1999) or as a logical order of work activities forming process steps (Van Der Aalst et al. 2016). Like discussed above, VCC constitutes a process converting resources to value. Therefore, the VCC process is a logical order of activities over time, which can be divided into process steps. In the SDL context, the VCC process is described as activities performed by different actors throughout the network (Lusch and Nambisan 2015). In order to efficiently distribute a process across different actors in a network, it is necessary to have clear boundaries between actors, specifying responsibilities and rights. Thus, our (1) first proposition in order to facilitate VCC is, that the internal value creation processes must be modular so that the individual process steps can be combined between actors in the network using defined interfaces.

Second, processes also include the participants involved in the activities carried out over time (Davenport 1993). SDL neglects the typical role hierarchy in value creation, which leads to the axiom that value is co-created by several actors (including the beneficiary) (Vargo and Lusch 2016). Customers are seen as active participants and primarily operant resources (Vargo and Lusch 2004). Seeing the VCC as a process throughout an A2A network without hierarchies leads to equal participants within the process. Therefore, our (2) second proposition is that all actors in the VCC process in the network are equal participants. This proposition addresses the generic building block (a) dialogue described above, that VCC requires equal problem solvers.

Third, a process converts an input into an output through value-added steps (Davenport 1993), whereby resource flows occur. An important part of these resource flows in processes is the information flow, which connects different activities in a process (Aguilar-Savén 2004). As described by Lusch and Nambisan (2004), the SDL regards operant resources such as knowledge and skills as a central unit of exchange among actors (Vargo and Lusch 2004). Thereby the flow of information constitutes the most important resource stream in the process. This leads to our (3) third proposition, that an efficient and preferably standardized communication between the actors for the transfer of information and knowledge must be established in order to reduce information asymmetry in the network to a minimum and thereby facilitate the VCC. The third proposition addresses (c) transparency and (d) risk assessment by providing information to all actors.

Fourth, another perspective on processes is focusing on information and IT systems used in processes (Van Der Aalst et al. 2016). Although automating processes and using IT does not always result in a better process (Trkman 2010), IT can have a positive impact on processes. As described by Chan (2000), IT has the ability to automate activities for more efficiency, capture large amounts of detailed process data without loss of information, gather and distribute knowledge and experience to improve the process, and connect different parties across large distances (Chan 2000). Resource liquefaction and resource density are important foundations for the SDL. The two principles require the separation of information from physical devices, e.g. through digitization, and the most efficient and effective delivery of these liquefied resources to actors (Lusch and Nambisan 2015). Combining these aspects with the three propositions outlined above leads to the (4) fourth and final proposition to facilitate VCC: There must be a cross-organizational IT support for the modular VCC process in the network, which allows the actors equal (b) access to liquefied resources. The focus must be on a continuous supply of information and an easy exchange of knowledge in order to guarantee the density of resources. The four propositions complement each other and if viewed in combination can be regarded as a conceptual framework to derive opportunities to improve VCC in an A2A network. The proposed IT support constitutes the basis in the conceptual framework. This illustrates, that the IT not only supports digitization but instead fosters digitalization in the sense of digital transformation in the network (Legner et al. 2017).

Embedded Case of a Value Co-Creation Network in the Textile Industry

The overarching process of the VCC in the examined A2A network was recorded prior to the case study. The process contains six phases: (I) customer contact, (II) requirements analysis, (III) build value chain and calculate, (IV) prototyping and feedback, (V) order and production, and finally, (VI) outbound logistics, and project closure (Grafmüller et al. 2018). In the following subsections, the four propositions are discussed in the case context.

Process Modularity and Combinability of Process Steps

The capabilities of the company in the network regarding the provided services strongly depend on their machinery in combination with the skills to use it. Making use of a specific machine resembles a step in the value creation process. Combining the different steps creates an instance of the overarching VCC process in the textile network. The sum of the machines of a network member in combination with the skills to use them for an activity forms the capability profile of this actor. During the duration of the case study one of the companies bought a new machine, which provided it with new production possibilities. The machine thus not only added a new capability to the company, but to the network as a whole. The document analysis showed, that the actors share basic information about their machines like the maximum width of fabric that a machine can handle so that the companies have basic interfaces to combine their process steps across the network. In the case of the newly-bought machine, the decision for an investment and the concrete parameters of the machine were dependent on the process steps immediately before and after the usage of the machine in the process. A simple form of non-digital interfaces the authors were able to observe was the usage of internal ordering forms of other companies in the network. Even the usage of internal product numbers of another actor to specify the chemicals this actor needs to provide could be observed. A lot of critical information only exists in the minds of individual employees such as the information "which actor can perform which service". In addition, the answer to the question "Which process step adds which functions to the textile" is only known by each supplier in his field of expertise. Even though the modular structure in the process is observable, the effective combination of resources is often not possible due to coordination problems and frequent iterations in the process (prototyping for new development of textiles). The process modularity and joined configuration could be supported by an IT solution, which all companies in the case study explicitly stated as very relevant in the questionnaire.

Equal Value Co-Creation Actors

Different actors were identified across the four companies in the network. The actors range from buyers, technical employees, to sales employees, managers, and customers, who influence the process in different ways. The companies categorize these actors into three stakeholder groups: customers, partners, and in-house actors. Interestingly, it could be observed that the sales employees had a comparatively high education, for example, a chemistry degree, as a high understanding of the product and process is important for the tech textile development. During the research and development processes, it is common for employees to visit the plants of the other companies in order to facilitate the collaboration in the value chain no matter if acting as a customer or partner. It could be noted that an unusually high number of highly educated subject matter experts of different companies interact to innovate in the network. The interviews, workshops, and questionnaire indicate this wide range of actors from technician to manager to IT systems. Although the companies see the different stakeholders as active valuable actors in the VCC and the actors seem to be equal, there is still the association with conservative stakeholder groups.

Efficient Information and Knowledge Flow

On the shop floor, we were able to observe how employees pass on information during the production process using paper labels and colored ribbons due to a lack of digital support. It was noticeable that in some companies each customer used a unique ordering form including handwritten notes and comments. The network partners and customers are strongly interwoven in the VCC process, including many interactions and much communication in the process. The interviews confirmed that important information is stored without structure or in systems which are not accessible to other network actors. Consequently, a lot of critical information is not immediately accessible. The companies stated that finding previous innovations takes a long time so that in some cases it is easier to come up with a new innovation instead. By examining documents such as the transcripts of valid solutions, requirements surveys, assignments, and process descriptions, it was notable that some documents are not machine-readable, most are unstructured, and the used vocabulary and measurement units vary by every network member. In regards to the classification of the actors into the stakeholder groups (customers, partners, and in-house actors) and the lack of standards for information and knowledge exchange, we asked the companies to rate their own communication in the network. The companies classified their communication behavior in the process phases according to five digitization levels. We could identify the levels via axial coding by analyzing the collected data from the case study (first level analysis). The levels (1-5) are: volatile (e.g. phone call),

persistent-simple (e.g. e-mail), persistent-structured (e.g. digital template), persistent-structured-shared (e.g. a shared database or file share with structured documents), and persistent-structured-shared-controlled (e.g. a workflow engine). The results are presented as mean values of the data of the four individual companies (cf. Figure 2). The communication within each company is satisfactory in the current situation. However, the flow of communication and information between groups is rather poor. In all companies, the interaction and communication in the network are deemed weakly digitized and standardized compared to internal ones.

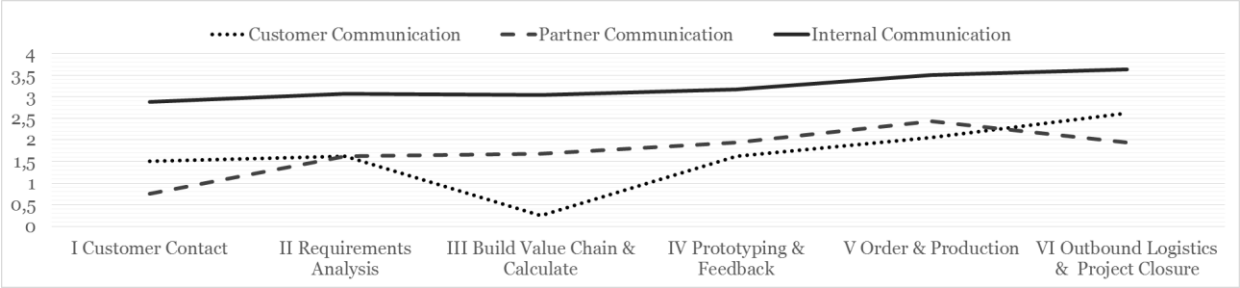

Figure 2. Digitization Levels in the Network's Information and Knowledge Exchange

The success of a new textile development strongly depends on the cross-company knowledge sharing between actors from the different stakeholder groups in the network. Without information from partners and customers or even joint experiments in the factory, innovations cannot be developed successfully. The knowledge is often an intellectual property of individuals and is not accessible for other actors in the VCC. Currently, cross-network planning is not possible without many requests into the network. A former solution to a similar problem is often not found in acceptable time. This means that every innovation depends on individuals and that it is often not possible to fall back on known solutions in the development process. To avoid this and facilitate the VCC, all actors must exchange expert knowledge in the process, with little tolerance for loss of information. There is a tension between the need to share knowledge and the concern to reveal too much knowledge to competitors in the same network. One company stated explicitly that there is a concern to share too much data in the network, which could lead to a loss of competitive advantage.

Cross-organizational IT Support

The companies do not use a shared IT infrastructure such as a collaboration platform. In the questionnaire, we asked which vision the companies have for an IT solution and which problems this IT solution should address. According to the companies, an IT solution that captures and processes the requirements of the network partners digitally, correctly, in detail, and bundled as well as enables analyses or evaluations is their collective vision. The most critical issues the companies describe are coordination problems within the network and information loss. It was determined that the requirements analysis, prototyping, and ordering phases offer the greatest potential for IT support. The companies were able to name relevant functions for an envisioned IT support in the network. Functionalities for the process description, recording, and configuration as well as the analysis of product, process, and network data were deemed important. Currently, there is still important information stored on paper or in unstructured files. The data objects used, for example, a request recording or a recipe description, are not standardized. Therefore, the documents are maintained in different formats and with different terminology throughout the network. Despite the low digitization in the VCC process, some machine plants possess the capability of data import via application programming interfaces; however, the companies still use manual input for configuration. The hindering factor for one company is the grade of process digitization, which is not sufficient to make use of the machine's technical capabilities. Another company still works with old legacy systems using MS-DOS (Microsoft Disk Operating System) applications. At one company, quality assessment is done by comparing the product with older physical product samples, which have to be time-consumingly retrieved from huge filing shelves. Another company has a sophisticated and externally certified quality management process. This leads to the conclusion that the companies are facing varying challenges with different grades of digitization and standardization in their internal processes, which contributes to the critical issues outlined above. Although this sounds difficult and is indeed hindering the VCC, the companies are still successful in their niche through knowledge advantage and personal commitment of the actors involved.

Discussion and Implications

The answer to our research question is, that on a general level the process must be adapted according to our propositions: process modularity, actor equality, information and knowledge flow, and cross-organizational IT support. The case study showed which implications arise for a specific network in practice. It could be observed, that the companies are aware of the necessity of process modularity and practice it to configure their VCC. However, the standardization using interfaces is lacking, which occasionally results in coordination problems and higher complexity in the communication. The claim of the first proposition could be corroborated in the investigated case. The concrete recommendations for facilitating the VCC, in this case, are standardizing the process step interfaces in the network and improving the digitization of the process documentation to save process configurations in order to foster concepts like the virtual company as described by (Hodges and Link 2018).

Shifting the world view from traditional roles like customer and suppliers to equally integrated actors leads to the possibility of improved resource integration in the VCC in the network (Lusch and Nambisan 2015). An example of what happens in the absence of this worldview could be observed in our case. The lack of awareness for the necessary digitization of inter-actor communication became a hindering factor for the VCC. The claim of the second proposition was supported by the observations in the face-to-face interaction of actors, but not when considering digital communication or documentation, where legacy processes are in place. The information asymmetry still poses a problem in the case, because often all but one actor loose access to the VCC results after the interaction. To address this issue, the companies need to increase their efforts to equalize the actors in supporting processes of the VCC. The previous predominant logic in the network has led to companies only optimizing their own information flows and thus neglecting the integration of other actors. The third proposition could not be confirmed by the case analysis due to an absence of an efficient information flow. However, the companies stated that insufficient information flow poses their collective biggest challenge and thus indirectly support the proposition. This leads to the recommendation, that all information flows in the network's VCC should be digitized and standardized (as it is already the case with internal flows) to facilitate VCC. In addition, the processes should be less dependent on individuals. The expert knowledge should be extracted in order to make better use of it in VCC. This can lead to fewer iterations in the process.

A cross-organizational IT support could not be observed. The companies exhibit varying levels of digitization and use of IT. The fourth proposition could not be confirmed by an existing IT solution, instead, the companies described a joint IT solution along the VCC process as their envisioned approach to facilitate the VCC. We recommend a joint IT platform, which can be used along the whole process. The aim is to improve cooperation through standardization and digitization. This approach is currently being implemented and evaluated within a three-year research project in the studied textile network. By this holistic approach, we believe that the digital transformation can advance in the network (Legner et al. 2017). In addition, such an IT platform provides a common world view by making the activities of all actors more transparent and defining common terminologies (Lusch and Nambisan 2015). The process knowledge (knowledge about the production techniques) in the considered network represents an operant resource and by recombination of this operant resource innovation can be generated (Hunt 2004). For this, however, this knowledge must be stored modularly and standardized on the platform. By digitally storing modularized process knowledge, the platform can be used to analyze this collection of knowledge, to find patterns, and to enable rule-based configuration of the process (Altuntas Vural 2017). Through the inclusion of all actors on the platform, an unhindered exchange of information and knowledge can take place. However, this also means that digital rights management must be taken into account in order to protect the sensitive data of the actors in the network.

Our research has implications for practice since our propositions can be used as a guidance for SME organized in networks in the endeavor of facilitating the VCC and thereby supporting the digital transformation in their network. Our findings also provide theoretical implications for research. Regarding the framework for service innovation by Lusch and Nambisan (2015), seeing VCC as a distributed process in an A2A network leads to the necessity of modular processes, as we suggest in our first proposition. Therefore, applying the modular architecture concept not only to the service platform layer but also to the VCC layer in the service innovation framework should be discussed. Furthermore, the impact of the concept "shared worldview" on this extension should be examined, too. We suggest that the common worldview in combination with modular processes in the network means that standardized interfaces in the process need

to be established. This can be combined with discussed solution in the VCC literature such as standardized briefing templates and dialog procedures (Aarikka-Stenroos and Jaakkola 2012). Those interfaces not only encompass a technical level, but also social and organizational levels. Additionally, our findings indicate that the topic of information asymmetry in value creation networks should be discussed further. To a certain extent, our suggested IT support can be viewed as an actor engagement platform which is still an open research issue (Storbacka et al. 2016). The information security issues Lusch and Nambisan (2015) discussed were corroborated by our case study. It is difficult to guarantee generalizability due to the single case study approach and the context of network research (Halinen and Törnroos 2005), which constitues a limitation of this paper. But given that 99,8% of the (non- financial) companies in Europe are classified as SME and the fact that a vast majority of them can be considered as low-tech manufacturing or not yet knowledge oriented (Muller et al. 2018), we believe that at least our propositions can be seen as a guidance for some of them on their way towards a digital transformation. Nevertheless, the propositions only build an abstract framework, a proper conceptualization is still missing.

Conclusion and Further Research

The paper at hand aims to answer how the examined textile companies should adapt their processes and how the according IT should look like to facilitate the VCC process in their network. For this, we conducted a single embedded case study with multiple UA in the German textile industry and derived implications for processes and IT in the network. Our case study underpins, that innovation is the key to success in mature low-tech industries in developed countries and therefore that knowledge and expertise are the most valuable resources in the networks. The case study showed that the exchange of the knowledge valuable for the VCC process is hindered by separate IT infrastructures, by general lack of digitization, and information asymmetry. Therefore, we conclude that a joint IT platform is a suitable measure to address the issues in the network and to foster the digital transformation. Next to our previous research agenda (cf. Grafmüller et al. 2018), with suggesting this inter-organizational IT artifact, new research issues arise such as how to address the problem of "oversharing" information with competitors or how to maintain such a shared IT platform. In addition to new research issues raised by this suggestion, the examination presented in this paper is based on a single case study and therefore further research needs to prove the generalizability of the results. Our paper provides a contribution to practice by giving concrete recommendations on how low-tech companies organized in networks can facilitate the VCC and to theory by suggesting some new perspectives on the service innovation framework.

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