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The advances of community cloud computing in the business-to-business buying process

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The Advances of Community Cloud Computing in the Business-to-Business Buying Process

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Abstract

In times of digitalization, new ways occur to integrate suppliers in the B2B buying process. Community cloud computing enhances the collaboration between B2B buyers and suppliers. However, so far, there is little empirical evidence on how B2B buyers can use community cloud computing to integrate suppliers in the B2B buying process. This study investigates the areas of application, motives, and risks of B2B buyers to use community cloud computing for supplier integration. We use an exploratory research design and conducted semi-structured interviews with 14 experts in the German market. Even though our results show that community cloud computing is not an established technology, we find that B2B buyers use cloud-based procurement systems to enhance supplier integration. Interestingly, cloud-based procurement systems appear in all steps of the B2B buying process. This study identifies four ideal types of B2B buying processes, whose manifestations depend on the buying situation and the importance of the product. The use of cloud-based procurement systems in B2B buying adds up to the three main outcomes cost reduction, time savings, and resource access. We provide recommendations to B2B buyers and suppliers facing the four types how to use cloud computing in order to establish long-term relationships. Finally, we open up new research areas to further explore this topic.

JEL Codes: M11, M15

Die Fortschritte des Community Cloud Computing in dem Business-to-Business-Kaufprozess

Zusammenfassung

In Zeiten der Digitalisierung ergeben sich neue Wege, Lieferanten in den B2B-Einkaufsprozess zu integrieren. Community Cloud Computing verbessert die Zusammenarbeit zwischen B2B-Einkäufern und -Lieferanten. Bislang gibt es jedoch kaum empirische Erkenntnisse darüber, wie B2B-Käufer Community Cloud Computing nutzen können, um Lieferanten in den B2B-Kaufprozess zu integrieren. Diese Studie untersucht die Anwendungsbereiche, Motive und Risiken von B2B-Käufern, Community Cloud Computing für die Lieferantenintegration zu nutzen. Wir wenden ein exploratives Forschungsdesign an und führen semi-strukturierte Interviews mit 14 Experten auf dem deutschen Markt durch. Obwohl unsere Ergebnisse zeigen, dass Community Cloud Computing keine etablierte Technologie ist, stellen wir fest, dass B2B-Käufer cloudbasierte Beschaffungssysteme nutzen, um die Lieferantenintegration zu verbessern. Interessanterweise tauchen Cloud-basierte Beschaffungssysteme in allen Schritten des B2B-Einkaufsprozesses auf. Diese Studie identifiziert vier ideale Arten von B2B-Einkaufsprozessen, deren Erscheinungsformen von der Einkaufssituation und der Bedeutung des Produkts abhängen. Der Einsatz Cloud-basierter Beschaffungssysteme beim B2B-Einkauf addiert sich zu den drei Hauptergebnissen Kostensenkung, Zeitersparnis und Ressourcenzugang. Wir geben B2B-Einkäufern und -Lieferanten, die mit den vier Arten von Cloud Computing konfrontiert sind, Empfehlungen, wie sie Cloud Computing nutzen können, um langfristige Beziehungen aufzubauen. Schließlich eröffnen wir neue Forschungsbereiche, um dieses Thema weiter zu erforschen.

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The Advances of Community Cloud Computing in the Business-to-Business Buying Process

1. Introduction

In the business-to-business (B2B) context, procurement has a crucial status, because its expenses account for the majority of a firm´s total costs (Degraeve, Roodhooft, and van Doveren 2005). Moreover, the role of procurement has changed from the search of the lowest price, with short-term cost effects towards the development of long-term relationships with relevant suppliers (Kollmann 2019). Emerging technologies provide B2B buyers with new ways to integrate suppliers (Batran et al. 2017; Kosmol, Reimann, and Kaufmann 2019). One option is to create cloud-based procurement networks (Muschinski 2018). While willingness to invest in networks has been low in recent years, more and more firms acknowledge the necessity hereof (Muschinski 2018). Community cloud computing (hereafter called CCC), a special type of cloud computing, helps firms to modernize supplier integration and interaction (mindsquare 2017). However, practitioners are still confused with regard to the possibilities of cloud computing to integrate suppliers and its impact (Koch 2020).

The existing literature has primarily investigated the overall effects of cloud computing, in particular CCC, such as increasing information sharing between B2B buyers and suppliers (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016) and higher transparency (Suherman and Simatupang 2017). However, to the best of our knowledge, prior research has not paid attention to the areas of application of CCC within the B2B buying process to integrate suppliers and which kind of integration occurs. Furthermore, existing literature has not scrutinized if the motives and risks differ along the B2B buying process in terms of cloud computing (e.g., Durowoju, Chan, and Wang 2011; Goyal 2014; Jones 2015). Therefore, we call for a more sophisticated view of the motives and risks. We identify a third gap of existing literature in the lack of emphasis on the resource-based view of the firm (RBV) (Barney 1991; Wernerfelt 1984) to explain the use of CCC in supply chain management with the (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016; Labes, Hahn, and Zarnekow 2015). Furthermore, there is no existing research that applied the RBV and the transaction cost economics (TCE) (Williamson 1985) to explain the use of CCC in the B2B buying process and the appearing effects.

Our study aims to identify when B2B buyers use CCC to integrate suppliers, as well as their motives and risks. Therefore, we define the following research questions:

1) In which B2B buying process steps does community cloud computing enhance the integration of suppliers, and which type of integration occurs?
2) What are the motives and risks of B2B buyers to use community cloud computing, and do these motives and risks differ along the B2B buying process?

To address this purpose, we conducted interviews with experts in the area of cloud-based procurement systems (cloud systems) and analyze the data with a qualitative content analysis to shed light on this unexplored topic.

The contribution of this study is manifold. First, we provide insight for the CCC research by showing that this special cloud technology is not common in the B2B buying context. Our investigation of the interrelations of the three concepts contribute to the marketing literature, the supply chain literature, and information system literature. Our study provides empirical evidence that B2B buyers use cloud systems in all process steps to integrate suppliers. Second, we advance existing literature on cloud computing by identifying that some motives and risks primary occur in certain process steps, whereas others are generic. Third, we contribute to academic research by showing that the use of cloud systems in the B2B buying process to integrate suppliers finds strong support for the RBV and the TCE.

The paper proceeds as follows. First, we outline existing research on digital technologies in procurement, in particular CCC, the B2B buying process, and supplier integration. Chapter three explains the methodology. Chapter four presents the empirical findings, including the areas of application, motives, and risks. In chapter five, we conclude with a discussion of results, implications, and the limitations of our study.

2. Theoretical Background

2.1. The Use of Digital Technologies in B2B Buying Processes

2.1.1. B2B Buying Processes

Generally, B2B buying processes have multiple levels and follow pre-defined standards (Backhaus et al. 2013; Weddling 2010). Since decades, researchers have stressed out the importance of understanding the buying processes and have tried to model them (Robinson, Faris, and Wind 1967; Webster and Wind 1972; Weddling 2010).

Robinson, Faris, and Wind (1967) explain that the B2B buying process follows eight steps: (1) recognition of the problem or need, (2) determination of characteristics and the quantity of

the item, (3) description of characteristics and quantity of the item, (4) search for potential sources, (5) acquisition and analysis of proposals, (6) evaluation of proposals and selection of suppliers, (7) selection of an order routine, and (8) performance feedback and evaluation.

This and other widely recognized approaches, such as by Webster and Wind (1972) and Weddeling (2010), start with identifying the need followed by specifying necessary factors, searching and evaluating suitable suppliers, and finally purchasing the product. More specifically, first, the information gathering phase that includes the identification of the need, the definition of specification, and the collection of information of suppliers. Second, the evaluation and negotiation phase, referring to evaluating the alternatives and negotiation with selected suppliers. The third phase includes the purchase and usage of the product, as well as a final performance feedback and evaluation (Grewal et al. 2015).

In this study, we apply the model of Robinson et al. (1967) due to its holistic, understandable, and precise nature (Anderson, Chu, and Weitz 1987), although it should be noted that the B2B buying process differs between products (Backhaus et al. 2013).

2.1.2. Digital Technologies in Procurement

Digital technologies refer to the use of technologies for manufacturing or for e-business activities such as online communications (Maqueira-Marín, Moyano-Fuentes, and Bruque-Cámara 2019). In supply chain management, firms count on technologies to handle the amount of information (Büyüközkan and Göçer 2018; Daneshvar Kakhki and Gargeya 2019; Gunasekaran and Ngai 2004).

In B2B buying, Grewal et al. (2015) distinguish between two forms of digital technologies that impact the way firms act and interact with each other. The first form is digital information technologies, where digital information technologies to computer systems, telecommunications, and data that is used for improving a firm´s daily operations. Examples are cloud computing, smart mobility, big data, social media, or the Internet of things. The second form are digital manufacturing technologies that capture 3D printers, digital design software, and digital scanners. Firms use these technologies to produce goods on their own as an alternative to external purchasing (Grewal et al. 2015).

Srai and Lorentz (2019) define digital procurement practice by distinguishing between basic and advanced digital technologies. The main purpose of basic digital technologies is to enable purchasing through the Internet (Kosmol, Reimann, and Kaufmann 2019; Schoenherr and

Tummala 2007; Srai and Lorentz 2019). On the other hand, examples on advanced digital technologies include advanced analytics, cloud computing, and big data and have appeared in more recent times (Kane et al. 2016; Lu 2017; Srai and Lorentz 2019).

Maqueira-Marín, Moyano-Fuentes, and Bruque-Cámara (2019), explain that technological advances, especially in procurement also cover intra-organizational and inter-organizational technologies. More specifically, intra-organizational digital practices refer to technologies to enhance business operations within a firm. For instance, such technologies can increase the efficiency of specific internal tasks within or between departments. Contrary, inter-organizational digital practices focus on the relationships between the firm and its supply chain partners, such as suppliers, customers, and governments (Kache and Seuring 2017; Makkonen and Vuori 2014). These technologies demand reciprocal input from two or more firms (Carter, Kosmol, and Kaufmann 2017; Terpend et al. 2008; Zimmermann and Foerstl 2014). For B2B buyers and suppliers, the inter-organizational relationship is considered as one of the most important relationships (Nyaga, Whipple, and Lynch 2010).

2.1.3. Supplier Integration in B2B Buying

The supply chain is a network existing of many supply chain partners and inter-organizational interactions (Carter, Rogers, and Choi 2015). The authors point out that the relationship between B2B buyers and suppliers is a manifestation. Literature discusses two levels of buyer-supplier relationships: adversarial and collaborative relationships (e.g., Dabholkar, Johnston, and Cathey 1994; Kaufmann, Esslinger, and Carter 2018; Wu and Choi 2005). Adversarial relationships are simple transactions, for instance, selling or buying products (Heide and John 1990). Matthyssens and Van den Bulte (1994) emphasize that these relationships have a clear price focus and consists of short-term contracts with high uncertainty about the further business relationship. Wu and Choi (2005) describe adverbial relationship with the primary goal of information collection and an arm length distance between both firms.

Şen et al. (2008) highlight that collaborative relationships positively impact both the selling and buying firm (Williamson 2008). Kosmol, Raimann, and Kauffmann (2019) state that characteristics are constant information exchange (Heide and John 1992) and trust (Ta et al. 2018). According to Poppo, Zhou, and Li (2016), trust refers to the reliability on the other supply chain partners. In such relationships B2B buyers and suppliers are willing to cooperate in the long run to benefit from each other (Dabholkar, Johnston, and Cathey 1994).

Extant literature has examined the classification of buyer-supplier relationships. Perona and Saccani (2004) present a taxonomy of four levels of buyer-supplier integration including: (1) traditional relationships, (2) operational partnerships, (3) technological partnerships, and (4) evolved partnerships. The integration increases from non-integration in traditional relationships to a high integration in evolved partnerships. During the operational partnerships a logistical integration occurs. Logistical integration means that the collaborating firms aim to reduce physical cost by frequently exchanging products. Technological partnerships appear when B2B buyers want to benefit from technological knowledge of the suppliers. During the third level, a technological integration occurs. The fourth level, evolved partnerships are characterized by a high integration, including logistical and technological integration Perona and Saccani 2004; Şen et al. 2008).

This paper is based on the taxonomy of Perona and Saccani (2004) as this classification provides precise objectives that B2B buyers aim to achieve with the different levels of integration. Either they want to reduce costs or gain access to resources such as technology and knowledge, or both.

2.1.4. Technologies in B2B Buying Driving Supplier Integration

According to Aral, Bakos, and Brynjolfsson (2018) the use of digital technologies in B2B buying leads to several supplier integrations, as IT enables B2B buyers to interact with more suppliers, because of lower search costs. Their findings also show that the usage of IT enhance long-term relationships with fewer suppliers. Hence, B2B buyers desire different integration levels by using digital technologies.

The logistical integration appears from a constant exchange of information (Lin 2014) allowing collaborative planning (Chen and Paulraj 2004). Technological integration occurs, for example, by cooperating with suppliers during new product development (Thomas 2013). Thomas (2013) explains that B2B buyers want to gain technical knowledge from the suppliers for an accurate predetermination of relevant specifications. Finally, digital technologies enhance evolved partnerships that are based on trust and continuity (Aral, Bakos, and Brynjolfsson 2018). Evolved partnerships help to share strategic relevant information in order to diversify in terms of market orientation and to explore innovative ideas (Şen et al. 2008). Therefore, these different integration levels reduce, for instance, the uncertainty of business relationships and enable firms to differentiate from competitors.

Previous research has shown that IT usage in B2B buying processes enhance buyer-supplier integration leading to trustful relationships (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016; Subramani 2004). An example is to make the inventory data assessable in real-time through the Internet (Chen and Paulraj 2004). Based on the RBV, B2B buyers and suppliers use their trustful relationships to collaborate with each other (Miles and Snow 2007). These inter-organizational relationship helps to create heterogeneous capabilities, leading to competitive advantages for both partners (Barney 1991). Overall, the existing literature indicates, that IT in B2B buying enhance buyer-supplier relationships finally leading to completive advantages for the collaborating firms.

Furthermore, not only the relationship between B2B buyer and suppliers benefits from the use of IT in B2B buying processes. Also, the implementation and the performance of digital procurement technologies depends on the ability and willingness of the involved partners to interact and communicate (Kache and Seuring 2017; Kosmol, Reimann, and Kaufmann 2019; Lin 2014). According to the RBV, collaborating firms benefit from each other, because of complementary resources (Barney 1991; Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016; Miles and Snow 2007). Thus, firms that collaborate can use digital procurement technologies more effectively leading to the creation of IT-capabilities. Results of prior research show that firms with high IT-capability have better profits and cost-based performance measures compared to firms with low IT-capability (Bharadwaj 2000). However, IT is an organizational capability (Bharadwaj 2000; Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016) to enhance other capabilities, rather than one on its own (Wu et al. 2006). To sum up, IT usage in B2B buying to integrate suppliers leads to a better overall performance of the collaborating firms.

Nevertheless, B2B buyers are confronted with plenty of transactions, since the market consists of a variety of suppliers. Examples for transactions in procurement include searching for reliable suppliers, contacting, making contracts, analyzing the performance of suppliers, and developing relationships with relevant suppliers. Especially, finding reliable suppliers goes along with high transaction costs. Reasons are the uncertain buyer-supplier environment and the specific investments made at the beginning of the relationships (Clemons, Reddi, and Row 1993).

Besides the buyer perspective, a transaction is also a risk for suppliers, because it remains unclear if the specific investments of suppliers in the sales transaction pay off. Therefore relationship-specific investments are essential to enhance inter-organizational integration

(Subramani 2004). The author explains that tendering processes to the specific needs of the B2B buyer is an example for relationship-specific investments. Nyaga, Whipple, and Lynch (2010) find out that suppliers share information and dedicate to long-term relationships to reduce the uncertainty of transaction specific investments. Nevertheless, B2B buyers tend to build close relationships with suppliers that have already made specific investments, since a certain degree of dependency is created (Lohtia and Krapfel 1994). The results of this integration could be cost reductions due to eliminating unnecessary processes and leaner processes (Chen, Daugherty, and Landry 2009).

In contrast, an increasing integration also has negative effects. For example, the deeper the integration, the higher the complexity of the interactions resulting in higher transaction costs (Clemons, Reddi, and Row 1993). Additionally, through relationship-specific investments, suppliers can create exit barriers at the buying side, resulting in a higher bargaining power of the suppliers (Ghosh and John 1999; Subramani 2004).

According to existing literature, the usage of IT in procurement, can reduce transaction costs (Clemons, Reddi, and Row 1993; Ghosh and John 1999; Lin 2014). Lin (2014) states that the use of digital technologies in procurement to integrate supply chain partners leads to operational benefits. Examples for these benefits are rising productivity in the short-run, but end-to-end processes between the B2B buyers and suppliers in the long-run.

B2B buyers also use digital technologies to increase integration and create long-term relationships with suppliers (Aral, Bakos, and Brynjolfsson 2018). The authors state that the possibility of a long-term relationship sets incentives for suppliers to make specific investments (Aral, Bakos, and Brynjolfsson 2018). In addition, Aral, Bakos, and Brynjolfsson (2018) find in their empirical study that purchasing firms that use digital procurement technologies are more dedicated maintaining relationships with suppliers. Their finding is in line with the core ideas of the TCE since an ongoing relationship reduce the uncertainty, because both partners learn about each other over time (Clemons, Reddi, and Row 1993)

Overall, the existing literature indicates that digital technologies in B2B buying enhance supplier integration. One the one hand, this integration leads to more efficiency and cost reduction. One the other hand, this integration improves the share of information between B2B buyers and suppliers. Both effects have strong support from the TCE, respectively RBV.

2.2. The Use of Community Cloud Computing in B2B Buying Processes

2.2.1. Community Cloud Computing

Cloud Computing is one of the emerging technologies of the past decade (Jones 2015; Marinos and Briscoe 2009) offering large potentials for firms (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016). Cloud computing enables firms to outsource their information technologies infrastructure to a third party. Firms access the resources on a demand basis over the internet. Thus, firm do not store their resources by themselves, which is called on-premise (Winkler and Brown 2013).

Four types of cloud models exist, including public cloud, private cloud, hybrid cloud, and community cloud (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016). At a public cloud (1), the firm providing the cloud services makes the infrastructure accessible for the general public without any further hurdles (Mell and Grance 2011). Private cloud (2) describes the cloud infrastructure used by a single firm for internal purposes. Hybrid cloud (3) consists of two or more of the three available models of cloud infrastructure. Finally, community cloud (4) is somewhere between the public cloud and private cloud. Community cloud has strong similarities to the private cloud, but the firms belonging to the community provide the IT-infrastructure. However, other literature states that also a third party, for instance, a cloud vendor can provide the IT-infrastructure (Goyal 2014; Mell and Grance 2011).

Following Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín (2016), we use the definition of CCC from the National Institute of Standards and Technology, US Department of Commerce. "Community cloud: The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises." (Mell and Grance 2011).

Since we investigate cloud-driven supplier integration in B2B buying processes, the business context of CCC is the paramount concern. Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín (2016) find that CCC enhance supplier integration. Therefore, the business context of CCC fits to answer our research questions. The authors also bring up that "there are some signs in the market that may indicate that this effect could already be occurring. Large, traditional technology providers specialized in supply chain management, such as SAP, are cur-

rently offering innovative community cloud-based solutions" (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016).

As any other technological advances cloud computing or, in particular, CCC has advantages and disadvantages (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016). Prior researchers have already studied comprehensively the potential benefits and risks. They all add up to two main benefits and two main risks. The benefits are creation of capabilities and higher profit, whereas the risks capture data security and reliability.

Concerning the first main benefit, the creation of capabilities. Based on Iyer and Henderson (2010), the use of CCC or in general cloud computing enables firms with capabilities and resources. A potential capability is the access to documents whenever and wherever needed (Ercan 2010; Iyer and Henderson 2010; Jones 2015). Other capabilities are virtual business environments by having a platform to collaborate with business partners independently on their geographical location (Iyer and Henderson 2010). Iyer and Henderson (2010) also state the addressability and traceability as essential capabilities. According to the authors, both capabilities refer to the ability of a firm to track documents through the whole organization. Moreover, their empirical study shows that especially for small and medium-sized firms, cloud computing enables them to gain access to IT-resources. Such IT-resources are normally available for large firms with strong financial background (Trigueros-Preciado, Pérez-González, and Solana-González 2013). Jones (2015) states that sharing resources with business partners through the cloud is another advantage. This leads to a higher informational integration of business partners (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016). Examples for such informational resources are information about production schedules, the current state of the inventory, and demand forecasts (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016).

The second main benefit refers to higher profits (Abdulaziz 2012). According to prior researches, the essential effects lay in the area of cost reduction including abolishing the licenses for software and the infrastructure for hardware, fewer human resources in the IT department, faster implementation, as well as through operating efficiency increases, due to higher agility and flexibility (e.g., Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016; Cheng et al. 2014; Durowoju, Chan and Wang 2011; Ercan 2010; Jones 2015). According to Cheng et al. (2014), the use of cloud computing increases the quality of managerial decisions due to better data availability.

However, sharing information, especially with external partners brings up the discussion of privacy and security concerns (Shkurti and Muça 2014). Besides that, if two or more firms are collaborating a lacking performance of cloud computing could occur (Jones 2015). In other words, the main shortcomings are security concerns and reliability. Examples for security concerns are low provider trust, the possibility that unauthorized people can see the data, compliance and legal issues, as well as the fear of hackers (Abdulaziz 2012; Iyer and Henderson 2012; Jones 2015; Trigueros-Preciado, Pérez-González, and Solana-González 2013).

In addition, reliability is essential when cooperating with business partners (Trigueros-Preciado, Pérez-González, and Solana-González 2013). The authors investigated potential barriers at small and medium-sized businesses. Their results show that poor performance, the availability of the cloud service, and difficulties to change the systems are major disadvantages. Based on Abdulaziz (2012) potential breakdowns of the servers of the cloud vendors is another concern regarding cloud computing.

2.2.2. The Impact of Community Clouds on B2B Buying Processes

From a general B2B buying perspective, CCC, or in general cloud computing has several impacts (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016; Srai and Lorentz 2019; Suherman and Simatupang 2017). First, CCC can connect and bind supply chain partners (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016). Furthermore, it has a positive impact on the informational-physical integration process (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016). A high informational-physical integration process means that a firm continually exchanges relevant business information with its supply chain partners (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016). Finally, the transparency across the supply chain increases (Srai and Lorentz 2019; Suherman and Simatupang 2017).

According to the RBV, sharing information with partner firms enhance trustful and reliable business relationships (Miles and Snow 2007). The authors state that the collaboration and exchange of information help firms to create capabilities of competitive advantage. Besides, since B2B buyers and suppliers use CCC to exchange information with a high frequency, the cost per transactions reduces. This conclusion finds strong support from the TCE (Labes, Hahn, and Zarnekow 2015).

Prior researchers have found single areas of application of cloud computing or CCC within B2B buying processes (Aral, Bakos, and Brynjolfsson 2018; Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016; Maqueira-Marín, Moyano-Fuentes, and Bruque-Cámara

2019). Maqueira-Marín, Moyano-Fuentes, and Bruque-Cámara (2019) state that an application area is the identification of suppliers. This statement goes in line with the empirical findings of Aral, Bakos, and Brynjolfsson (2018). The authors show that the use of digital technologies in procurement leads to the integration of more suppliers for tenders, due to lower search costs. A second application area is the negotiation process. B2B buyers can use electronic auctions to efficiently buy components (Maqueira-Marín, Moyano-Fuentes, and Bruque-Cámara 2019). In detail, Electronic-procurement (e-procurement) solutions capture electronic auctions, electronic marketplaces, and electronic catalogs. An electronic marketplace is a platform on the Internet where firms can conduct transactions among themselves or identify finding suppliers using internet technologies (van Weele and Essig 2017). The cost reduction is the underlying motive for the cloud usage in both areas of application.

Furthermore, through CCC B2B buyers and suppliers can share relevant business information. (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016). On the one hand, these data can help during the supplier selection process (Şen et al. 2008). On the other hand, more and more firms already integrate suppliers during product development to provide better products (Thomas 2013). The aim of this integration is to gain knowledge from the suppliers. Hence, a supplier integration driven by CCC finds support from the RBV, because both partners provide information for mutual gains (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016).

Overall, the existing literature shows single areas of application of cloud computing or, in particular, CCC in the B2B buying process. The occurring effects such as efficiency increase, and resource sharing find support by the RBV and TCE.

3. Method

3.1. Research Method

Qualitative methods help researchers to investigate unexplored topics and scrutinize processes that happen between businesses (Griffin 2012). Examples are the purchasing decision process or acceptance and interaction with new technologies (Buber and Holzmüller 2009). Cloud computing, or in particular CCC is an emerging technology and its use in the B2B buying process to integrate suppliers is an unexplored field.

We decided to conduct expert interviews for the following reasons. First, the expert interview is a systematic approach for gathering data from a special target group that has an exclusive

knowledge about the research topic (Kaiser 2014). Moreover, it is a time-efficient research method to gain information from persons that are under high time pressure (Meuser and Nagel 2009).

We used semi-structured interviews with open-ended questions, which is an appropriate method to answer a pre-defined research question. According to Kaiser (2015), this method also allows the experts to speak freely and ensures to collect all relevant aspects related to the research area. Moreover, semi-structured interviews follow an interview guide, which links the various interviews in order to make them comparable (Magerhans 2016). To develop the interview guide, we applied the process of Kaiser (2014). The process aims to translate the research question into interview questions, by deriving dimensions for the analysis and batteries of questions.

3.2. Sample Description and Data Collection

First, we defined who are potential experts for our empirical investigation. According to Kaiser (2014) and Meuser and Nagel (2009), an expert is defined as a person with additional knowledge that goes beyond the everyday knowledge. The knowledge is often on a specific area of expertise and tied to a function or professional role (Kaiser 2014). Therefore, we selected the experts according to a set of criteria. First, they had to have a background in the procurement area. Second, they had to have a profound understanding of cloud systems as users, vendors, or independent consultancies. Lastly, they had to hold a managerial or strategic relevant position to evaluate the impact of cloud systems on procurement.

Afterward, we identified the firms by a multi-functional approach, including an in-depth analysis of press releases and customer references of cloud-vendors (e.g., Coupa, Onventis, Oracle, and SAP Ariba (Hafen 2018)). Additionally, we researched through professional networks, such as LinkedIn and Xing, and also used our personal contacts. We also applied the snowball sampling method (Noy 2008) by asking the experts for further contacts. We were able to conduct semi-structured interviews with 14 experts in the German market. In Table 1, we provide an overview of the experts, a short description of the business activity of the firm, and the position of the experts. We interviewed different groups of experts to obtain a comprehensive and at the same time sophisticated picture of the topic. The first group (users) are firms that implemented cloud systems in their procurement department. The second group (vendors) are providers of cloud systems. Finally, we interviewed consultancies from the area of supply-chain-management and procurement with specialized expertise in cloud systems.

During the selection process, we placed importance on the fact that the firms were different regarding their industry to capture the broad range of B2B buying processes (Backhaus et al. 2013). Whenever possible, we conducted the interviews in person, unless the expert suggested a telephone interview.

ID	Group	Description	Position
1	User	A German firm with a portfolio of services in the areas of testing and certification, auditing and consulting	CEO
2	User	The German head office of a tool manufacturer from Liechtenstein	Strategic Buyer
3, 4	User	A German subsidiary of an international manufacturer of flexible insulating materials	Global Lead Buyer, Support
5	User	A regional daily newspaper for the area around the city of Osnabrueck, the Emsland, and other regions	Purchasing and Property Management
6	User	A diversified international group for electronic household and office products	Procurement Agent
7	User	A German manufacturer of semi-trailers, trailers, trailer services, and trailer technology	Strategic Buyer
8	User	Manufacturers in the field of trenchless rehabilitation of pipes	Strategic Buyer
9	Vendor	A German software firm that provides cloud-based procurement systems and supply chain services	Solution Expert Procurement
10	Vendor	A cloud-based provider for strategic and operational procurement processes	CEO
11	Consulting	SAP and SAP Ariba partner for on-premise, cloud, and hybrid procurement solutions	Partner & Member of the executive board
12	Consulting	The German supply chain and operations department of one of the Big 4 accounting firms	Senior Manager
13, 14	Consulting	A German IT and management consultancy	Manager, Manager

Table 1: List of Experts

The final selection of experts is well diversified. In total, we conducted twelve interviews (seven users, two vendors, and three consultancies) with fourteen experts in Germany and an average duration of 55 minutes. During the interview number three and twelve, two experts took part in each of both interviews. Among the experts were CEOs, members from the executive board, managers, as well as strategic buyers.

To conduct the interviews, we followed our interview guide. Each interview started with a discussion between the expert and me about the structure of B2B buying processes. The basic purpose was to create a common understanding. During this interview part, we showed the expert our chosen ideal B2B buying process. Based on this common processual information

foundation, we started with the main part. First, we asked the experts to tell me which steps of the ideal B2B buying process they conduct in their cloud system. Then, we asked them what motives and risks are associated with cloud systems in general. Subsequently, we asked them if the motives and risks differentiate along the B2B buying process. Next, we asked clarifying questions, which we adapted from prior research (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016) to identify if the basic concept of community cloud computing is in use. Then, we introduced the concept of community cloud computing and discussed potential areas of application, motives, and risks. During this main part, we asked further questions to gain more insights regarding the different topics.

We audio-recorded all interviews and transcribed them for further analysis. For transcribing, we applied the transcription rule of Meuser and Nagel (2009). The interviews took place from the 3rd week of January to the 2nd week of February 2020.

3.3. Data Analysis

In order to analyze the data, different approaches exist. Mayring (2010) differentiates between three major forms: the summarizing content analysis, the structuring content analysis, and the explicative content analysis. Kuckartz (2018) also explains three variations: the content-structuring qualitative content analysis, the evaluative qualitative content analysis, and the type-forming qualitative content analysis. The aim of our analysis is to identify aspects and structure the whole data regarding these aspects in order to answer our research questions. Therefore, the content-structuring qualitative content analysis fits the best for this purpose.

We apply the approach from Kuckartz (2018) since the central concept is the same as for the structuring content analysis of Mayring (2010). Both approaches slightly differ, for example, regarding the development of categories. Mayring (2010) stresses out the importance of the theory-based approach. Kuckartz (2018) and other researchers (e.g., Rustemeyer 1992; Schreier 2012) leave open, to what extent the categories are based on theory or developed inductively from the data.

We apply the deductive-inductive development of categories from Kuckartz (2018). After an initial examination of the content, we took the overall topics of the interview guide, such as the B2B buying process, cloud-based procurement systems, community cloud computing, as well as motives and risks as main topical categories (Kuckartz 2018). Since we followed the process of Kaiser (2014) to develop the interview guide out of our research questions, the overall topics are suitable. Then, we structured the complete data regarding these main cate-

gories. Next, we compiled all text passages of a category and developed sub-categories directly from the material. To ensure the quality of the inductive development of the sub-category, we applied the coding system to subset before coding the complete data (Kuckartz 2018). For a deeper understanding of this coding step, we provide a detailed example of our coding logic. After the second coding process, we compiled all text passages of each sub-categories and wrote summaries. Afterward, we analyzed the categories according to coherences. During this step, we aimed to achieve a comprehensive picture of our research area to interpret the findings with regard to our research questions. We conducted the development of categories and the coding with MAXQDA 2020 (Kuckartz 2018). Figure 1 illustrates the analysis process of this study.

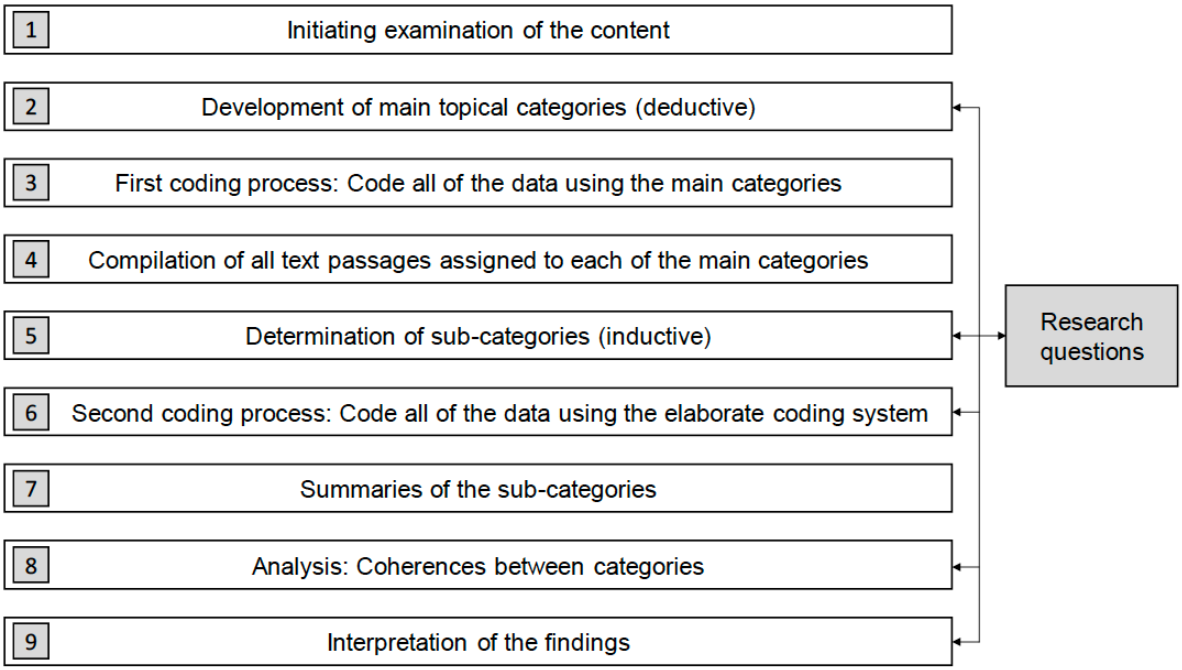

Figure 1: Analysis Process of this Study

3.4. Assessment of the Quality of the Study

To assess the quality of our empirical investigation, we followed previous research with a comparable methodology. More specifically, we apply the methodology suggested by Mayring (2002), introduces six criteria of qualitative research: documentation of research process, validation of interpretation, research process followed rules, nearness to research, communicative validation, and triangulation (Marying 2002).

Next, research process followed rules requires that a qualitative study must follow a procedure that counts, especially for the analysis of the data. An example is the development of the

categories. Based on Kuckartz (2018), the main categories should be closely related to the research question and neither too general nor too specific. To ensure this, we took the topics of the interview guide as main categories.

Regarding nearness to research, qualitative research should be as close as possible to the everyday life of the expert. To ensure this criterion, we only interviewed experts who are working in procurement with specialized knowledge in cloud systems.

Communicative validation refers to possibilities to ensure the quality of the categories, the coding, and the interpretation. Possible options are discussions with other researchers, consultation of the experts afterward, or testing the findings with an ensuring quantitative study (Backhaus et al. 2013). The experts of our study are employees from middle or upper management and therefore have a limited time budget. A discussion with other researchers is not suitable for time reasons. A quantitative study to test our proposed propositions is the recommended second step.

Finally, triangulation requires to consider more perspectives regarding the research questions to compare the statements. In this study, we interviewed three different groups of experts, including users, vendors, and consultancies. The opinions of the three expert groups corresponded in almost all aspects and therefore, this criterium is fulfilled.

4. Findings

4.1. Types of B2B Buying Processes

The findings of the empirical study consist of three major parts. First, we explain the necessary terminology and illustrate the four ideal types of B2B buying processes. Second, we state different areas of application of cloud along the B2B buying process. In the third part, we present the motives and risks of cloud systems and how they differ along the B2B buying process.

Starting with the first major part of the findings. The results show the practical applicability of the ideal B2B buying process from theory. Even though the experts identified themselves with the theoretical process, practitioners define procurement with two separate processes. The first practical process is the purchase-to-pay process and the second one is the source-to-contract process. Purchase-to-pay refers to the operational procurement, including the initial need identification and the ensuing purchase of a product or service (Bogaschewsky and

Müller 2019). In the ideal B2B buying process, purchase-to-pay capture step 1 “need identification” and step 6 “buy and use”. Source-to-contract, as part of the strategic procurement, addresses the process steps from the specification of requirements of the identified need, tendering, till negotiation with suppliers (Bogaschewsky and Müller 2019). In the ideal B2B buying process, source-to-contract includes the step 2 “establish specifications”, step 3 “search for alternatives”, step 4 “evaluate specific alternatives”, and step 5 “negotiation with suppliers”.

The experts explained that B2B buying processes are highly heterogeneous. The results reveal two dimensions to classify B2B buying processes. First, the buying situation and second, the importance of the category of goods. According to the experts of this study, B2B buyers simply differentiate between *“two buying situations”* (Expert 7): a new product and an existing product. The difference between a new and an existing product buying situation is the availability of product data and established suppliers. Our findings show that the buying situation impacts the manifestation of B2B buying processes. For an existing product, the process is less complex. In other words, an existing product will pass through fewer process steps.

Next, the importance of a category of goods. This dimension depends either on the procurement volume, or on the strategic relevance, or a mix of both criteria. First, the procurement volume as the dominating criterion. For instance, B2B buyers, who work for a firm with €1.00 billion in total procurement volume, will not evaluate the quality of an existing product of €10,000. Second, the strategic relevance is the dominating criterion. For example, a firewall, which has a high relevance, because it protects the internal data. Hence, B2B buyers will determine the specifications as precisely as possible and try to find the most suitable supplier. Third, a mix of both criteria. According to the experts, firms will start the source-to-contract process when facing a strategic-relevant and high-cost product. A specific example is a car manufacturer purchasing window lifters for a new car model. The following statements support the importance of the category of goods as the second determining dimension:

“I would like to differentiate according to the importance. (…) This can depend on the turnover (…) but it also depends on the importance for the business and the risk behind it.” (Expert 12)

“Depends on (…) the category of goods, whether it is an A, B, or C material.” (Expert 10)

By applying this classification system, we derived four ideal types of B2B buying processes (see Figure 2).

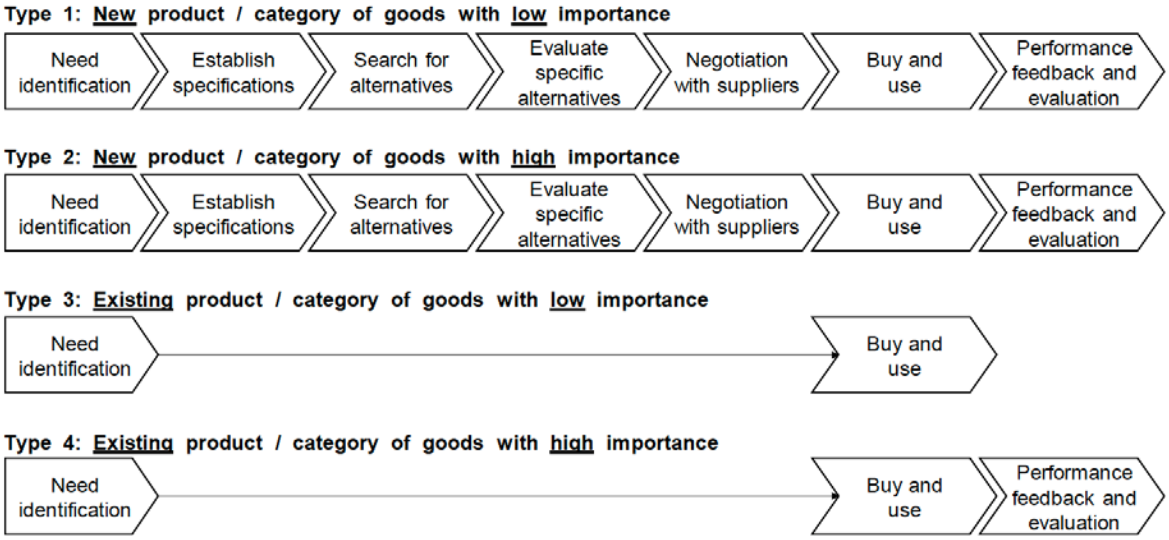

Figure 2: Four Types of B2B Buying Processes Based on the Expert Interviews

Type 1 refers to a new product buying situation for a category of goods with low importance (hereafter called type 1). In contrast, type 2 refers to a new product buying situation but for a category of goods with high importance (hereafter called type 2). An example of type 1 is *"laptops"* (Expert 5), and an example of type 2 is *"window lifters"* (Expert 12) in the automotive industry. Type 3 refers to an existing product buying situation for a category of goods with low importance (hereafter called type 3). In comparison, type 4 illustrates the buying process of an existing product buying situation for a category of goods with high importance (hereafter called type 4). An example of type 3 is *"biros"* (Expert 9) and for type 4 *"gears"* (Expert 9).

The B2B buying processes for types 1 and type 2 are the same regarding the manifestation, but they differ due to the activities within each process step. Especially during the source-to-contract process. For instance, the level of detail to "establish specifications" (step 2) is much higher for an important category of goods. Also, the B2B buying processes for types 3 and type 4 are comparable except for step 7 "performance feedback and evaluation". The reason for the differences is the importance of the category of goods. For example, the quality of gears does matter for the final product of a firm in comparison to biros. Type 1 and type 2 differ from type 3 and type 4 regarding the source-to-contract process (step 2-5). The explanation is that for purchases of type 3 and type 4 data, such as specifications, price, and established suppliers exist.

4.2. Areas of Application of Cloud Systems in B2B Buying Processes

4.2.1 Type 1 and Type 2 of the B2B Buying Processes

The second major part addresses the areas of application of cloud systems in the four types of B2B buying processes. Besides, we explain in which process steps cloud systems enhance the integration with suppliers.

The preliminary results indicate that B2B buyers can purchase basically *"everything from the cloud."* (Expert 11). Additionally, *"all processes are fully supported by the cloud."* (Expert 11). The experts also define the supplier as *"the most important partner in (…) [the] entire procurement process"* (Expert 9). Therefore, *"you deal with the supplier in all process steps"* (Expert 9) and different levels of supplier integration take place. Following statement confirms this finding:

"This can be at [any step] if we take your chart now" (Expert 10).

However, our findings reveal that the way how B2B buyers use cloud systems to integrate suppliers differs regarding the four types of B2B buying processes. Starting with type 1 and type 2, Figure 3 demonstrates the areas of application of cloud systems along the B2B buying process to integrate suppliers. Besides, we provide the degree of pervasion consisting of three levels. Cloud systems used in process step, cloud systems partly used, and cloud systems not used.

	The B2B buying process						
	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
Types	Need identification	Establish specifications	Search for alternatives	Evaluate specific alternatives	Negotiation with suppliers	Buy and use	Performance feedback and evaluation
Type 1[a)]	-	+	+	o	+	+	-
Type 2[b)]	-	o	o	o	o	o	o

Notes: a) type 1 is a new product buying situation for a category of goods with low importance, b) type 2 is a new product buying situation for a category of goods with high importance. Legend: +: cloud systems used in process step, o: cloud systems partly used, -: cloud systems not used.

Figure 3: Use of Cloud Systems for Supplier Integration in Type 1 and Type 2

B2B buyers that face purchases of type 1 use cloud systems in the process step 2 to 5 with an overall high pervasion, whereas step 1 and 7 are not cloud-based. For step 1 "need identification" no data is available, which the cloud system could use to identify the need proactively. The reason is the new product buying situations.

With step 2 "establish specifications" the source-to-contract process starts. Cloud systems fully support the source-to-contract process. The essential user, for example, an employee from the marketing department has a need. The employee can specify the need, for instance, by adding an *"internet link to the specifications"* (Expert 5) in the cloud system. During this process step, B2B buyers maybe want to check some information such as price before searching for potential suppliers. Therefore, B2B buyers send a *"RfQ, request for quotation where (…) [they] only want a price for a clearly specified service"* (Expert 12). Following statement underline this impersonalized interaction between B2B buyers and suppliers through the cloud system:

"For example, if I (…) [want] cell phone covers or something [like that] we don't want to interact, you want the price and you're good" (Expert 12).

Moreover, our results show that cloud systems fully support step 3 "search for alternatives". The platforms from the cloud providers act as networks or communities where B2B buyers and suppliers can interact. If B2B buyers need to search for suppliers for a new product, they can use the cloud network to reach out to potential suppliers that are registered on the platform:

"This network (…) can be used here at various points in the process (…). For example, in finding suppliers" (Expert 9).

"I think a cloud application offers us even more potential applicants that can underbid each other. At the moment, we only have what we can find on the Internet via Google or through our established websites." (Expert 6)

The interaction with suppliers during step 3 is non-personal. Through cloud systems, B2B buyers can tender new products with low importance and collect necessary information upfront. The reason why cloud systems can handle this process step is the low complexity and exchangeability of purchases of type 1. The following statement underlines this finding:

"If search for alternative addresses the process step tendering, then this is a process that can take place in the cloud." (Expert 12)

To collect proposals and "evaluate specific alternatives" (step 4), cloud is partly applicable. On the one hand, B2B buyers can use cloud systems to collect the proposals and prepare an overview of all alternatives.

"[It doesn´t matter] whether it is from supplier A or B or whether it costs two cents more or less is often irrelevant. So, I go on platforms (…) and say I need a pencil and who is the cheapest and give it to me" (Expert 9).

On the other hand, the actual evaluation takes place offline and without interaction with the suppliers.

During step 5, "negotiation with suppliers" cloud systems are in place for purchases of type 1, due to the low complexity and comparability of purchases of type 1. For instance, so-called electronic auctions are possible. These negotiation tools require a high integration of suppliers. *"Everyone has to be at the computer at the same time"* (Expert 12), but without personal interaction. The following statements strengthen this finding:

"It is possible to conduct e[lectronic]-auctions for products for which there are several suppliers, and which can be easily compared in terms of specifications." (Expert 3)

"Evaluate specific alternative, for example, sourcing, where I use a tendering system to send out invitations (…) to my suppliers, answer questions, obtain offers and, if necessary, negotiate and conduct auctions" (Expert 12).

After the B2B buyer selected the most suitable supplier, an interaction takes place by transmitting the purchase order. One expert stated that step 6 *"buy and use"* is *"in many cases already cloud-based or is being switched now"* (Expert 12).

Regarding the final step "performance feedback and evaluation" the expert mentioned that this is not common for products with low importance because B2B buyers *"assume that it is good"* (Expert 12). However, an evaluation can take place when B2B buyers want to continue purchasing from the supplier. But the evaluation is but not cloud-based.

With regards to purchases of type 2, our findings reveal that cloud systems appear in the same process steps as for type 1. Again, cloud systems occur in step 2 to 6, and step 7, whereas step 1 is not cloud-based. The difference compared to type 1 is the pervasion within each process step. Figure 3 shows that for step 2-6 and step 7 B2B buyers only partly use cloud systems to integrate suppliers.

For step 1, the reason is the absence of data to identify the need. Afterward, B2B buyers initiate the source-to-contract process. Next, step 2 “establish specifications”, cloud systems have support functions, to collect information. A typical option is a request for quotation for price indications. Besides, a request for information, where the B2B buyers want to know if the suppliers can produce a specific product. Also, a request for proposal, where the suppliers should tell how he would manufacture a product.

Next, our findings show that cloud systems cannot fulfill all requirements of B2B buyers regarding the establishment of specification for purchases of type 2 yet. The reason is the high complexity. For example, window lifters for a new car model are strategically relevant for a car manufacturer. Hence, during the new product development process *“many engineers defined the specification”* (Expert 13). Besides the internal development meetings, if *“new products (…) are developed (…) you have to integrate suppliers”* (Expert 7) and *“this will not take place completely in the cloud, because the system cannot replace the human interaction”* (Expert 12). During the personal interaction, the B2B buyers want to *“absorb the technical knowledge”* (Expert 7) of the suppliers.

During step 3 “search for alternatives“, our findings show a diversified picture. On the one hand, the cloud systems and their networks enable B2B buyers to screen the supplier market to *“identify potential new (...) firms”* (Expert 2) and to support activities to *“create a tender”* (Expert 7). On the other hand, our results reveal that for purchases of type 2 *“supplier identification is not a purely cloud-based process”* (Expert 12). The cloud systems do not replace visiting exhibitions and the *“[personal] interaction with suppliers”* (Expert 12).

Afterward, B2B buyers collect the offers of potential suppliers and evaluate them (step 4). The results show that cloud systems support this process steps, because all information, such as the tender and the proposals are uploaded in the cloud system. But especially the evaluation of purchases of type 2, is not wholly cloud-based. The reason is that the products are less comparable due to high complexity. Moreover, due to the high importance, the evaluation requires a deeper analysis of the alternatives.

Next, the “negotiation with supplier” (step 5) requires a high integration and interaction between the B2B buyers and suppliers. Cloud systems help again to provide overviews of all offers and the current state of the negotiation. But for purchases of type 2 our findings show that the actual negotiation takes place personally. The following statements strengthen this finding:

"We conduct the negotiations in a normal way. We invite the suppliers, or we even go there together with the technicians." (Expert 7)

„When I think about our negotiations, I would miss the interaction." (Expert 3)

The actual purchase (step 6; "buy and use") of purchases of type 2 through the cloud is not entirely mature. The processes are complex and *"highly specialized (…) with a direct integration to the supplier"* (Expert 11) and therefore are not easy to describe in the cloud-system. In contract, two experts mentioned that they purchase specialized equipment and very individual products through an *"open text space"* (Expert 1; Expert 5) in the cloud system.

Finally, our results show that step 7 "performance feedback and evaluation" for purchases of type 2 is possible to conduct in the cloud system. Nevertheless, it should be mentioned that another expert broad up a contradictory perspective by stating the following:

"I don´t know any solution at the market, which allows a cloud-based comprehensive evaluation and feedback." (Expert 12)

4.2.2 Type 3 and Type 4 of the B2B Buying Processes

Type 3 and type 4 address the buying situation of an existing product and it is common such products occur on a regular basis. Figure 4 demonstrates the areas of application along the B2B buying process to integrate suppliers as well as the degree of pervasion.

	The B2B buying process						
	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
Types	Need identification	Establish specifications	Search for alternatives	Evaluate specific alternatives	Negotiation with suppliers	Buy and use	Performance feedback and evaluation
Type 3[a)]	o					+	
Type 4[b)]	o					+	o

Notes: a) type 3 is an existing product buying situation for a category of goods with low importance, b) type 4 is an existing product buying situation for a category of goods with high importance. Legend: +: cloud systems used in process step, o: cloud systems partly used, -: cloud systems not used.

Figure 4: Use of Cloud Systems for Supplier Integration in Type 3 and Type 4

When B2B buyers have found a suitable supplier, they *"do a contract [or catalog] to standardize this special need"* (Expert 13). As we demonstrate in figure 2, the B2B buying processes of type 3 and type 4 do not capture the source-to-contract process (step 2-5). After the initial "need identification" (step 1) to the actual purchase (step 6; "buy and use") takes place. The two types differentiate due to the importance of the category of goods.

Starting with purchases of type 3, cloud systems are partly in use during the initial "need identification" (step 1). One the one hand, the common opinion is that no interaction between B2B buyers and suppliers takes place. The following statement underlines this finding:

"The essential user already has his own needs and can now enter an e[electronic]-procurement system and search for his need, for example, in a standardized catalog" (Expert 13).

On the other hand, for specific cases, such as *"facility management (…) smoke detectors (…) report to the supplier that they are going to break down three weeks in advance"* (Expert 10). A fully automated and highly interactive integration with the supplier takes place. Hence, the use of cloud systems to integrate suppliers depends on the individual case.

The actual purchase (step 6; "buy and use") of purchases of type 3 also happens within the *"catalogs"* (Expert 10; Expert 12; Expert 13). To have these catalogs in the cloud system and conduct the purchase online is *"absolute best practice"* (Expert 11). The reason is *"the processes are easy to describe and to illustrate in the cloud system"* (Expert 11). During this process step, a *"high degree of interaction is taking place (…) but highly automated and no personal interaction"* (Expert 10).

The final *"performance feedback and evaluation"* (step 7) is not common for purchases of type 3, because *"it´s expected to be correct and if anything is wrong, the essential user will complain"* (Expert 12).

Finally, purchases of type 4, such as gears, are products that are directly manufactured within the final product of a firm. *"The specifications are known"* (Expert 9) and defined in a contract. When B2B buyers need a certain amount of gears, they make use of the contract.

Starting with step 1, the "need identification" commonly appears at the internal departments, for instance, the production. The essential user can purchase the product from a contract. However, there are cases for which a *"production planning program derives fully automated the needs. (…) and they are conveyed automatically to the supplier"* (Expert 13). It remains to

be noted that the experts did not particularly mention that cloud systems support this function. Our study rather reveals that *"an ERP[Enterprise-Resource-Planning]-based-system triggers the needs"* (Expert 13).

Besides, our results reveal that B2B buyers can directly integrate the suppliers in the system through a *"Vendor Managed Inventory System"* (Expert 10; Expert 11). Through this system, supply chain partners gain immediate insights about needs, inventory as well as production schedules (van Weele and Essig 2017). This area of application is somewhere between the initial need identification and the actual purchase.

During step 6 "buy and use" our results show the actual purchase takes place in the cloud system with fully automated processes and a high interaction between suppliers and B2B buyers.

In contrast to type 3, B2B buyers evaluate purchases of type 4 and provide feedback to suppliers. They also use this information for "supplier relationship management" to develop suppliers with a long-term focus. The results reveal that cloud systems are partly used during this process step. The reason is that the actual *"supplier relationship meetings take place offline"* (Expert 2). Following statement supports this finding:

"Within the quality management (…) the longer the collaboration and [the higher] the value, the more likely I would say that it still takes place offline" (Expert 13).

Nevertheless, the cloud systems have a support function within the "performance feedback and evaluation process" (step 7). The B2B buyers can create a *"workspace for each supplier, where all information"* (Expert 2) are collected.

4.3. Motives and Risks of Cloud Systems in B2B Buying Processes

4.3.1 Motives along B2B Buying Processes

The third major part of the findings captures the motives and risks of B2B buyer to use cloud systems. First, we explain how the motives and risks differ regarding the steps of the B2B buying process. Afterward, we state the general motives and risks. Starting with the motives that differ regarding the B2B buying process. Eleven out of fourteen experts mentioned transparent processes as a motive for cloud systems. Transparent processes refer to the ability to track activities, to have an overview of all relevant information, and to access this information whenever needed. According to the experts, transparent processes are relevant to all seven

steps of the B2B buying process. However, the findings show a coherence between this motive and the four types of B2B buying processes.

B2B buyers facing purchase of type 3 and type 4, value the transparency in step 1 and 6. An example is the *"Vendor Managed Inventory System"* (Expert 10; Expert 11). Moreover, *"digitalization and automation require complete transparency"* (Expert 10). Transparent processes also support B2B buyers to conduct performance evaluations and use them to develop relationships with relevant suppliers. According to an expert, the *"integrated workspace (…) enables (…) procurement managers from [all over the world] to give feedback and the managers for the category of goods (...) can see them"* (Expert 2).

For B2B buyers facing purchase of type 1 and type 2, transparent processes improve the whole source-to-contract process (step 2-5). Effects include *"process security"* (Expert 14), time saving due to fast findability of documents, and usage of existing firm knowledge. Following statements support these findings:

"It allows me to [show] suppliers much faster what they eventually told or sent me. The information is there, and I know where to find it" (Expert 7).

"Procurement managers in other countries have access to certain templates, for example" (Expert 2).

Next, eleven out of fourteen experts mentioned lean processes as a motive for cloud systems. Lean processes refer to the elimination of wasteful activities to reduce costs. There are three ways of how cloud systems create lean processes. First, *"cloud-products provide clear standards"* (Expert 11) and do not allow "special wishes" (Expert 11). The aim is to capture the *"greatest common denominator for business processes"* (Expert 10). Second, by eliminating redundant tasks within the process. An example of a redundant task is the request from the essential user to B2B buyers for every single need. Third, by reducing the available product portfolio. The effects occurring through lean processes differentiate regarding B2B buying processes.

The experts mentioned that for purchases of type 3 and type 4 the main effects of cloud systems are higher process efficiency by eliminating wasteful tasks. This elimination leads to *"process cost reduction"* (e. g. Expert 5; Expert 3; Expert 12) and *"time saving"* (Expert 14). An example is a large firm that has not established electronic catalog yet. The essential user sends a single request for biscuits of €10.00 or production material with a procurement vol-

ume of €500,000.00. Through the implementation of a cloud system the essential user does not request biscuits at the procurement department anymore. Instead, a direct purchase through the system is possible. Hence *"the internal process cost reduction is tremendous"* (Expert 12).

For B2B buyers facing purchases of type 1 and type 2, lean processes occur during the source-to-contract process (step 2-5), for instance, using standardized formats to conduct tenders.

"I can also receive pre-defined complex sourcing from [the] (…) system (…). We do not have to do everything by hand. We would rather see a process efficiency" (Expert 14).

According to ten out of fourteen experts, usability is a motive for cloud systems. *"These systems look more modern, nicer, and are much easier to handle"* (Expert 14). Cloud systems create an *"Amazon-like-Shopping-experience"* (Expert 11; Expert 12) for B2B buyers. In table 5, we illustrate the usability occurs in step 1 and 6 for purchases of type 3 and type 4. Besides that, in step 3 for purchases of type 2. For step 1 and 6 the Amazon-like-shopping leads to a higher process efficiency due to the elimination of redundant tasks, such as the request for the essential user.

Usability occurring during the process step 3 leads to a more valuable working. Cloud systems already include artificial intelligence tools such as *"chatbots"* (Expert 11). They provide B2B buyers with additional information. Examples for supporting information are hints that a contract already exists, and which documents are necessary to attach before sending the tender to potential suppliers. Especially for *"new procurement managers (…) this is absolutely useful"* (Expert 7).

Six out of fourteen experts emphasized continuous processes as a motive for cloud systems. Continuous processes mean that a consistent process is created by operating one or fewer systems instead of many. The effect of continuous processes refers to *"media breaks"* (Expert 12) that occur when employees transfer data from a system to another. A typical example of media breaks is the data transfer from Microsoft Outlook to Excel. Together with continuous processes, the experts also mentioned: *"consolidated data quality"* (Expert 2) and *"reduction of mistakes"* (Expert 12). B2B buyer value the effects of continuous processes during the procure-to-pay (step 1 and 6) and the source-to-contract (step 2-5).

Five out of fourteen experts mentioned the motive identification of new suppliers. This motive only refers to the third process steps *"search for alternatives"*, and therefore only for purchases of type 1 and type 2. B2B buyers expect through the cloud networks to identify *"new potential applicants"* (Expert 6) but also to find more suitable suppliers for their requirements. The following statements support this finding:

"When selecting suppliers, we wanted to have access to a larger supplier network" (Expert 2).

"This is a pure functionality that you can´t get from on-premises. Where do you want to address (…) [so many] suppliers?" (Expert 9).

4.3.2 Risks along B2B Buying Processes

In this section, we address the risks of cloud systems that differ regarding the B2B buying process. Nine out of fourteen experts and all three expert groups mentioned data security as a risk of cloud systems. Notably, the consultants stated that the concerns regarding security have declined in the last years. The following statements strengthen this finding.

"In 2015/2016, there were still many firms that were reluctant to go into the cloud and were afraid to put their data in the cloud. But that issue no longer exists" (Expert 11).

"Three to five years ago, most firms had security concerns. In the meantime, this has declined sharply because people simply assume that it is safe" (Expert 12).

Our results allow a more sophisticated assessment of this risk. Especially for B2B buyers facing purchases of type 2, data security is a crucial risk. During the complete source-to-contract process (step 2-5) firms are concerned that *"third parties [could get access] to data[, which are] not intended for them"* (Expert 9). An often-used example is the automobile industry, especially the development of a new car model. The following statement explains this example:

"Again, an OEM example. If they take a complex drawing into their sourcing event, they are naturally afraid that this complex drawing will get into the wrong hands. Because that is their USP [Unique Selling Point] in the worst case" (Expert 13).

For purchases of type 4, security concerns appear during step 7, since B2B buyers consolidate relevant data regarding relevant suppliers within the cloud-based workspaces. For purchases of type 1 and type 3, the experts explained that *"there are no concerns"* (Expert 11) or *"few*

risks" (Expert 13). According to the experts, this might be because of the low importance of the category of goods.

Furthermore, eight out of fourteen experts stressed out the risk of limited functionality of cloud systems. The results reveal that this affects purchases of type 2. The drawbacks of cloud systems using standards to reduce complexity are the limited functionality as well as the possibility to adopt the systems. For purchases of type 2, B2B buyers need special functionalities, such as attaching a variety of documents to a bill-of-material (Gartner 2020a) during the source-to-contract process (step 2-5). The following statements underline this finding:

"Especially for the process step sourcing (…) I would like to have more functionality and to be more flexible, which [the] market does not offer me yet" (Expert 12).

"But the upload of (…) the description of complex products, for example, we want to build a power plant. (…) specifications, technical description, patents etc. (…) are attached to a bill-of-material. The [cloud] solutions are simply not designed for tendering these complex services yet." (Expert 11)

Five out of fourteen experts emphasized supplier-related problems. This problem consists of two aspects. First, B2B buyers face the problem that relevant suppliers are *"not ready to fully embrace digitized and automated processes"* (Expert 2) or *"not willing"* (Expert 3) to interact through cloud systems. Second, the cloud systems are not able to replace the personal interaction with suppliers. Both aspects only appear for purchases of type 2 in step 2, step 3, and step 5. This is due to the importance of purchases of type 2 and the high interaction with the suppliers in all three process steps. However, an expert mentioned that he is *"willing to accept"* (Expert 2) losing some relevant suppliers. Another expert also mitigated this risk by explaining that *"the important suppliers participate"* (Expert 11) in cloud systems.

Finally, two out of fourteen experts mentioned the risk high effort for restrictions as a drawback of the implementation of cloud systems. The results indicate that two different areas of application appear. On the one hand, during the purchase-to-pay process for purchases of type 3. B2B buyers put in a *"lot of administration effort"* (Expert 5) to define all restrictions regarding purchase permissions within the electronic catalog systems. On the other hand, over the whole source-to-contract process for purchases of type 2, B2B buyers should pre-define *"to what extent is a department authorized to communicate with the supplier"* (Expert 6).

4.3.3 General Motives and Risks

Our findings reveal additional motives and risks that do not differ regarding the B2B buying processes. General motives are: compliance aspects, participation in constant development of the cloud systems, lower IT-costs, faster implementation, and benefits for suppliers such as identification of new customer. General risk capture: dependency on cloud providers, acceptance of employees, different speed, language barriers, and data privacy.

Transparent processes allow firms to track every single activity and is useful regarding *"compliance aspects"* (e.g., Expert 1; Expert 7). Five out of fourteen experts mentioned compliance as a motive to implement cloud systems.

Four out of fourteen experts stated that participation in constant development of the cloud systems as a motive. The cloud systems *"update themselves automatically"* (Expert 13) and the firms *"partially hand over the responsibility"* (Expert 11) to the cloud provider. New functions and updates *"could also be passed on to the customer immediately and this is not possible with the on-premise solutions"* (Expert 11). Furthermore, this reduces IT-related competitive advantages, because *"if my competitor is better than me, I am technologically defeated"* (Expert 12). All statements regarding this motive came from consultants and none of the cloud user mentioned this motive.

The drawback of the motive participation in constant development of the cloud systems is the dependency on cloud providers. B2B buyers have a problem when they need special functionalities, but the cloud provider does not offer them. Six out of fourteen experts mentioned this risk. Even one cloud provider refers to the limited adjustability of cloud systems. The expert from the cloud provider illustrates it with the following statement:

"Individualization is the arsenic in the business model of a cloud service provider." (Expert 10)

The hand-over of responsibility to cloud providers also leads to lower IT-costs. Seven out of fourteen experts mentioned this motive. In this context, two aspects causing the reduction of IT-costs. First, cloud users do not have *to "host and maintain the systems on (…) [their] own"* (Expert 12). Second, cloud users need less specialized *"knowledge"* Expert 11), which is a *"clear economic benefit"* (Expert 10), because the cloud providers have expert knowledge.

Three out of fourteen experts stated that faster implementation in comparison to on-premise as another general motive for cloud systems. *"Cloud [systems] are (…) ready to go"* (Expert 9) and adjustments can be implemented directly in the systems due to an *"agile project approach"* (Expert 11). In contract, an expert from a firm that uses cloud systems provided following argument regarding the implementation:

"And we had the hurdles that such a technical solution is very bulky at first. [The cloud providers] promise that (…) it can be implemented smoothly. (…) we noticed that it's not always that easy" (Expert 6).

Furthermore, cloud systems also provide benefits for suppliers, such as identification of new customers through cloud networks. These networks are a *"chance for [suppliers] to generate more deals"* (Expert 11).

According to the experts, the acceptance of employees is a crucial risk of cloud systems. Seven out of fourteen experts stated that. Five experts are cloud users that experienced this problem and two experts are consultants that reflected their customers. New systems are "always a change for the users" (Expert 6), especially when the old system was *"established and (…) reliable"* (Expert 6). According to the consultants, a reason causing non-acceptance of a new system is *"bad Change-Management"* (Expert 14).

Further risks that are stated once are: different speed, due to different governmental conditions regarding mains supply. Language barriers because cloud systems are normally monolingual or bilingual. Finally, data privacy caused by the location where the cloud provider operates the servers.

5. Discussion

5.1. Interpretation of the Results

5.1.1. Cloud-Driven Supplier Integration in B2B Buying Processes

The primary goal of this study was to attempt to find areas of application of CCC along the B2B buying process to enhance supplier integration. Moreover, we aimed to identify the motives and risks of CCC and how they differ with regards to the B2B buying process steps.

The results of this study reveal that CCC is not in use in B2B buying processes. In addition, however, the overall direction of the results shows a trend towards communities between B2B buyers and suppliers driven by cloud systems. There are at least two reasons why we do en-

dorse this alternative concept. First, Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín (2016) state that there are cloud systems in the market that enable firms to achieve community effects.

Second, independent statements of experts of our study strengthen this alternative concept:

"This is a classic advantage that may only cloud solutions can provide. Because otherwise, there is no shared platform, where several buying firms and suppliers would come together. These are perhaps the community clouds, these networks. And we use them sensibly in many process steps" (Expert 9).

"The internet is the absolute transparency machine. But what's still a problem, and that's where these community characters are very important. [A cloud] network (…) also provides the connectivity data, [such as] "digital readiness and the maturity of process integration of suppliers[, which enable] the direct integration of business processes" (Expert 10).

Thus, we conclude that B2B buyers use cloud systems to enhance supplier integration.

Additionally, the results reveal that B2B buyers use cloud systems in all steps of the B2B buying process. However, different areas of application occur regarding the four types of B2B buying processes. We find that the buying situation and the importance of the category of goods determine the manifestation of B2B buying processes. Subramaniam and Shaw (2002) show similar results in their empirical study. They find that web-based procurement occurs in all steps of the B2B buying process and the impact differs regarding the characteristics of the process. Hence, we support Subramaniam and Shaw (2002) by indicating that their general findings also account for cloud computing.

The next finding of our study shows that B2B buyers facing purchases of type 1 use cloud systems during the source-to-contract process (step 2-5) and in the final purchase (step 6; "buy and use") to integrate suppliers. Regarding step 3 "search for alternatives", our findings are in line with Maqueira-Marín, Moyano-Fuentes, and Bruque-Cámara (2019). The authors point out that cloud computing can help to identify new suppliers. Furthermore, the findings of Aral, Bakos, and Brynjolfsson (2018) strengthen this conclusion. The authors stress out that firms that use digital technologies in procurement can interact with more suppliers, because of reduced searching costs. Five experts of this study stated that finding new suppliers is a motive to use cloud systems in procurement, which strengthens our conclusion and the findings of prior literature. In accordance to our findings, the reason for this is that the pur-

chases of type 1 are less complex and exchangeable. Hence, B2B buyers can find a variety of comparable suppliers on cloud platforms.

Our findings also show that B2B buyers use cloud systems during step 5 “negotiation with suppliers” for purchases of type 1. This is in line with Maqueira-Marín, Moyano-Fuentes, and Bruque-Cámara (2019), who state that firms use electronic auctions to purchase. The authors also mention that electronic auctions allow to purchase more efficiently. This study identifies similar effects. The efficiency results from two effects. First, because of time saving due to transparent processes. Second, from leaner processes due to higher standardization.

Interestingly, the results reveal that B2B buyers also use cloud systems to “establish specifications” (step 2). A task is the request for quotation, where B2B buyers want to know the price for a product. Suppliers provide this information upfront without knowing if they will be able to offer a proposal. According to the experts of our study, this process is fully supported by the cloud with the overall effect to increase process efficiency. A possible explanation for this early interaction between suppliers and B2B buyers is that suppliers share information to reduce the uncertainty of the transaction (Nyaga, Whipple, and Lynch 2010). To our very best knowledge, prior literature has not identified comparable insights.

In addition, our findings show that B2B buyers use cloud systems in the actual purchase (step 6; “buy and use”) has not emphasized by previous research. Based to our experts, an explanation for the use is the low complexity of purchases of type 1. Thus, the process “buy and use” can be designed in the cloud systems.

Taking now into account the level of supplier integration and interaction, our findings show that suppliers are highly integrated but with a non-personal interaction. An example from the findings is the electronic auction, where all involved parties must be online at the same time. This fits to the integration level operational partnership with a logistical integration and the overall aim to reduce physical cost (Perona and Saccani 2004).

The intention of B2B buyers to use cloud systems to integrate suppliers during purchases of type 1 is to increase efficiency and therefore to reduce costs. This conclusion finds strong support by the TCE. For instance, Clemons, Reddi, and Row (1993) point out that establishing reliable suppliers has high transaction costs, due to the high uncertainty at the beginning of a buyer-supplier relationship

Regarding purchases of type 2, our results show that B2B buyers only partly use cloud systems during the source-to-contract process (step 2-5) and in the final purchase (step 6) to interact with suppliers. Our findings also reveal that B2B buyers use cloud systems to support requesting information during the determination of specifications, identification of suppliers, preparing tenders and negotiations, as well as providing overviews of proposals. Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín (2016) find that suppliers and B2B buyers are in a constant exchange of data through cloud systems. This interrelation provides the B2B buyers a good overview of all potential alternatives at any time. The TCE underlines this finding, because B2B buyers have high transaction costs, especially in finding reliable suppliers (Clemons, Reddi, and Row 1993). Cloud systems provide essential information and, therefore, support B2B buyers to identify and choose the most suitable supplier.

Nevertheless, our findings reveal that cloud systems cannot fulfill all requirements for purchases of type 2 yet. The reason is the high complexity pf the products making them hard to describe in the cloud systems. The findings also show that during step 2 "establish specifications" B2B buyers want to absorb knowledge from suppliers and therefore integrate them more. There is a necessity for personal interaction that is not possible to replace by the cloud systems.

Taking now into account the levels of supplier integration by Perona and Saccani (2008), it can be assumed the cloud systems used for purchases of type 2 enhance evolved partnerships. This level includes logistical and technological integration. On the one hand, B2B buyers use cloud systems to support supplier meetings. During these meetings, the B2B buyers want to gain technical knowledge referring to technological integration. On the other hand, they want to reduce the physical costs, which fits to the operational partnership. However, B2B buyers facing purchases of type 2 meet with suppliers in person rather than just operating through the cloud systems. Hence, we conclude that cloud systems support evolved partnerships rather than creating them.

Picking up the argument of the TCE that finding reliable suppliers is a high-risk process, B2B buyers want to know everything about suppliers for purchases of type 2. The results show that for purchases of type 2 cloud systems have limited functionality of providing all necessary information. Therefore, the uncertainty of findings the right supplier rises, leading to higher transaction costs. To conclude, our findings regarding the limited use of cloud systems for purchases of type 2 finds support from the TCE. The reason is that using cloud systems alone would lead to insufficient information, which in turn would increase transaction costs.

To summarize, B2B buyers use cloud systems to integrate suppliers more intensively for a new product buying situation for a category of goods with low importance (type 1) than for a category of goods with high importance (type 2). Consequently, we propose the following:

Proposition 1. Considering a new product buying situation, the lower the importance of the category of goods, the more B2B buyers use cloud systems to integrate suppliers during the B2B buying process.

Regarding purchases of type 3, the results show that B2B buyers use cloud systems to conduct the purchase-to-pay process (step 1 and 6). During step 1 "need identification" cloud is partly used to integrate suppliers. There are special cases where the "need identification" is initiated automatically. This occurs through the integration of suppliers within the cloud system. Nevertheless, it is common that the "need identification" for purchases of type 3 appears at the essential user and therefore no interaction with the suppliers happens.

Besides that, the results reveal that cloud systems fully support step 6 "buy and use". During this step, an *"intense"* (Expert 10) integration of suppliers takes place. The interaction occurs fully automated and with high frequency. This finding is in line with Van Weele and Essig (2017). The authors explain that electronic catalogs allow to transfer need request directly to suppliers and web-technologies enhance this process.

The level of supplier integration provides an explanation for cloud systems occurring during these two process steps. The high frequency of exchanging the same products, the complete automation, and the focus of cost reduction lead to the conclusion that an operational partnership occurs (Perona and Saccani 2004).

Picking up the TCE, this finding has strong support because of two reasons. First, transaction costs decrease due to the high frequency. Second, the uncertainty of the relationship decreases due to the dedication towards a long-term relationship, because the longer the relationships the higher the cost reduction.

Finally, the results show that B2B buyers facing purchases of type 4 use cloud systems during the purchase-to-pay process (step 1 and 6) as well as for the final "performance feedback and evaluation" (step 7). Starting with step 1 "need identification". We find that internal production planning systems can trigger needs for products of type 4. Thus, we assume that cloud systems support this process. We suggest taking this interpretation with caution, because our study doesn´t directly reveal that cloud systems occur in the first process step for purchases of

type 4 and no empirical evidence from existing literature exist. Moreover, vendor managed inventory systems allow mutual insights regarding production schedules and inventory data. Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín (2016) support our finding. They find that community cloud computing positively impacts the informational integration between supply chain partners.

During step 6 "buy and use" for purchases of type 4, the findings lead to the same conclusion as for purchases of type 3. The interaction is characterized by a high degree of automation and high frequency.

Considering the level of supplier integration, during step 1 "need identification" a technological partnership can be assumed. A possible explanation is the reciprocal share of information between the partners. Also, B2B buyers want to gain knowledge from suppliers, such as inventory data. This knowledge gain has support by the RBV, because it can enable B2B buyers and suppliers with unique knowledge (Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín 2016). The authors state that suppliers can provide better products, which again improve the processes of B2B buyers. Hence, the cloud system enables competitor advantage for both supply chain partners. For "buy and use" an operational partnership appears enhancing a logistical integration (Perona and Saccani 2004). The logistical integration aims to reduce cost and enhance long-term relationships. This goes in line with the core ideas of the TCE.

All four types of B2B buying processes include the initial "need identification" (step 1) and the actual purchase (step 6; "buy and use"). On the contrary, B2B buyers use cloud systems for purchases of type 3 and type 4 more intensively than for type 1 and type 2 to integrate suppliers during these two process steps. Therefore, we propose the:

Proposition 2a. For an existing product buying situation, the integration of suppliers through the cloud systems during step 1 "need identification" is higher than for a new product buying situation.

Proposition 2b. For an existing product buying situation, the integration of suppliers through the cloud systems during step 6 "buy and use" is higher than for a new product buying situation.

Proposition 3a. The buying situation is the dominating factor regarding the areas of application of cloud systems within the B2B buying process to integrate suppliers.

Proposition 3b. The importance of the category of goods determines to what extent B2B buyers use cloud systems to integrate suppliers.

5.1.2. Motives and Risks of Cloud Systems in B2B Buying Processes

A comparison of the motives shows that transparent processes, lean processes, usability, continuous processes, and identification of new suppliers are motives that differ regarding the steps of the B2B buying process. Whereas compliance, participation in constant development of the cloud systems, lower IT-costs, and faster implementation are general motives for cloud usage. Moreover, our findings allow allocating the motives that differ along the B2B buying process to the four types.

Some of the findings are in line with previous literature. Starting with transparent processes, Suherman and Simatupang (2017), find that cloud usage leads to higher transparency along the supply chain. The results indicate that B2B buyers facing a purchase of type 1 and type 2 value transparency during the source-to-contract process (step 2-5). In contract, B2B buyers that deal with purchases of type 3 and type 4 experience beneficial effects of transparency during the purchase-to-pay process (step 1 and 6). Besides, for type 4, the motive transparent processes occur for the final "performance feedback and evaluation" (step 7). According to the findings, cloud systems provide additional valuable information during the source-to-contract process, which finds support from the RBV. Whereas during the purchase-to-pay process, cloud systems enable a more efficient purchase of products, which goes along with the TCE.

As far as we know, the motive lean processes has not been identified as a beneficial effect resulting from cloud systems yet. Nevertheless, a connected interpretation of two prior studies allows me to draw a conclusion. Bruque-Cámara, Moyano-Fuentes, and Maqueira-Marín (2016) find that a cloud usage in supply chain management leads to supplier integration. Chen, Daugherty, and Landry (2009) state that an integration leads to leaner processes due to the elimination of redundant tasks. Thus, we conclude that cloud systems lead to lean processes.

Regarding the motive usability, Subramaniam and Shaw (2002) state that web-based procurement systems have a high user-friendliness. In contrast, our findings reveal that the high usability comes along *"with the cloud products"* (Expert 11). An explanation is that the higher usability of software systems comes along with the constant technological process. Since cloud computing is one of the emerging technologies within the last decade, the usability of

cloud products is higher compared to older software systems. Furthermore, the findings show where usability positively impacts the B2B buying process. According to the experts of our study, usability occurs for purchases of type 3 and type 4 during the purchase-to-pay process (step 1 and 6). The reason for this is the created "Amazon-like-shopping" experience for B2B buyers leading to a more efficient procurement process. This finding finds strong support from the TCE, because the transaction costs are minimized due to fewer process steps. For B2B buyers facing a purchase of type 2, the usability impacts tenders by providing necessary extra information. This support leads to fewer mistakes and a knowledge transfer. The RBV supports this conclusion, because the provided knowledge is transferred from experienced employees to new employees. This results in competitive advantages in comparison to firms without such knowledge transfer (Barney 1991).

The motive continuous processes receives strong support by Lin (2014). The author mentions that a technology-driven supply chain integration results in end-to-end processes between supply chain partners. The findings additionally show that the motive of continuous processes differs regarding the four types of B2B buying processes. For example, during the source-to-contract process (step 2-5) B2B buyers value the impact of cloud systems that all procurement tasks can be done in the cloud systems. The effects are increasing efficiency and process cost reduction, which again is supported by the TCE (Clemons, Reddi, and Row 1993).

Overall, with the use of cloud systems B2B buyers aim to achieve either a cost reduction or collect and share information. However, the motives for cloud systems differ regarding the steps of the B2B buying process. To summarize, we thus propose:

Proposition 4a. For an existing product buying situation, the cost reduction resulting from cloud systems is higher than for a new product buying situation.

Proposition 4b. Considering a new product buying situation, the lower the importance of the category of goods, the higher the effect of cost reduction of cloud systems.

Proposition 5a. For a new product buying situation, the exchange of information resulting from cloud systems is higher than for an existing product buying situation.

Proposition 5b. Considering a new product buying situation, the lower the importance of the category of goods, the higher the effect of cloud systems to collect and share information.

Additionally, Aral, Bakos, and Brynjolfsson (2018) mention that firms that use IT in procurement can get in touch with more potential suppliers. Their empirical research strengthens

the finding that cloud systems positively impact the identification of new suppliers. Hencewe propose the following:

Proposition 6. Considering a new product buying situation, the lower the importance of the category of goods, the more B2B buyers use cloud systems to identify new suppliers.

Our findings regarding the general motives compliance, lower IT-costs, and faster implementation are in line with the comprehensive study of Jones (2015). But as far as we know, the finding that cloud users benefit from the participation in constant development of the cloud systems has no empirical evidence yet.

A comparison of the risks of our study indicates that data security, limited functionality, supplier-related problems, and high effort for restrictions are risks that differ regarding the steps of the B2B buying process. Whereas dependency on cloud providers, acceptance of employees, differences in speed, language barriers, and data privacy are generic risks.

Some of the results find support by Jones (2015). The empirical study shows that lacking performance is a risk of cloud systems supporting the finding of differences in speed. The author also underlines our findings regarding the risks data privacy, dependency on cloud providers, and limited functionality. Moreover, Abdulaziz (2012) points out the concern of data security when firms use cloud computing to store relevant documents.

The findings reveal some new insights, such as supplier-related problems, acceptance of employees, and language barriers. A possible explanation for supplier-related problems could be that cloud systems (i.e., cloud-based procurement systems) are designed to support B2B buyers. Regarding the acceptance of employees, the study indicates that a reason could be bad change management of the firm during the implementation of cloud systems. The reason for language barriers could be that the established cloud providers are in Germany and the US (Hafen 2018).

Furthermore, our findings allow a more sophisticated interpretation of the risks by allocating them to the B2B buying process steps. Data security appears during the source-to-contract process (step 2-5) for purchases of type 2, as well as for purchases of type 4 during step 7. One explanation might be due to the high importance of purchases of type 2 and type 4. Firms have concerns that unauthorized third persons could get access to these strategic relevant data. In addition, our findings show that the overall concerns regarding data security have declined. Jones (2015) points out that data security could be a benefit, which underlines our findings.

The decreasing concerns regarding data security especially counts for products with low importance (type 1 and type 3). Thus, we propose the following:

Proposition 7. The higher the importance of the category of goods, the more B2B buyers are concerned about data security of cloud systems.

The results show that limited functionality only occurs during the purchase-to-pay process (step 2-5) for purchases of type 2. This might be due to the high complexity. Hence, these products are less describable in the cloud system and B2B buyers cannot conduct the complete source-to-contract process with the cloud system yet. The risk supplier-related problems go in the same direction, because suppliers providing purchases of type 2 expect a personal contact. Cloud systems cannot replace that. Therefore, we suggest the following:

Proposition 8. Considering a category of goods with high importance, B2B buyers are more concerned regarding limited functionality of cloud systems for a new product buying situation than for an existing product buying situation.

Additionally, the risk high effort for restrictions occurs during the purchase-to-pay process (step 1 and 6) for purchases of type 3 and during the source-to-contract process (step 2-5) for purchases of type 2. For both types, the procurement department defines authorization rules. For instance, not all products are available for everyone and not every B2B buyer is authorized to speak with suppliers during the source-to-contract process. This finding goes in line with Abdulaziz (2012), who states that authorization is a concern of cloud computing. Hence, we propose:

Proposition 9a. Considering an existing product buying situation, the lower the importance of the category of goods, the higher the effort to define restrictions during the purchase-to-pay process within the cloud system.

Proposition 9b. Considering a new product buying situation, the higher the importance of the category of goods, the higher the effort to define restrictions during the source-to-contract process within the cloud system.

5.2. Managerial Implications

The new function of a procurement department is the identification of new ways to reduce costs in combination with the establishment of long-term relationships with relevant suppliers. Cloud computing, as an emerging technology in procurement, receives increasing interest

among B2B buyers regarding collaborated working. However, many of them remain confused about the possibilities of cloud systems to fulfill the expectations of cost reduction and the creation of long-term buyer-supplier relationships. Our study helps B2B buyers and suppliers to identify the areas of application of cloud systems within B2B buying processes to achieve these expectations.

This study shows that the outcomes of cloud usage in B2B buying are cost reduction, time savings, and resource access. These outcomes result from underlying conditions that differ regarding the manifestation of B2B buying processes. Our study suggests that B2B buyers that have no cloud systems in procurement yet should start with purchases of type 3 and type 1. The reason is that their processes are easy to design in the cloud system. Afterward, a firm can apply cloud systems for standardized purchases of existing production material (type 4) and finally for purchases of type 2. In the following, we give recommendations for practitioners regarding the four types of B2B buying processes to impact the underlying conditions. We structure our recommendations by starting with B2B buyers facing type 3, followed by type 1, type 4, and type 2. Then we provide general advice for B2B buyers and end with suggestions for suppliers.

For purchases of type 3 (i.e., an existing product buying situation for a category of goods with low importance), the use of cloud systems in B2B buying processes leads to a cost reduction. This cost reduction results from the following underlying conditions: lean processes in combination with high usability, transparent processes, and continuous processes. To achieve lean processes, B2B buyers can use the necessity of standardization within cloud systems to reduce the complexity of the product portfolio and the processes. First, we recommend B2B buyers to scrutinize and discuss the existing portfolio for purchases of type 3, such as office equipment with the essential users.

The second recommendation addresses the existing processes. Since cloud systems provide clear standards and do not allow individual wishes, the complexity of processes can be reduced. Thus, B2B buyers should scrutinize and discuss the existing processes with the essential users and agree on the lowest common denominator.

The other underlying conditions high usability, transparent processes, and continuous processes occur when firms implement cloud systems in procurement. For instance, the results show that cloud systems have high usability. Especially for purchases of type 3 electronic catalogs that are now integrated into the cloud systems enable B2B buyers to experience the

“Amazon-like-shopping”. Wasteful processes are eliminated because the supplier is integrated. Hence the essential user can order the product directly within the cloud system.

Therefore, we recommend B2B buyers that have no cloud systems in procurement yet, to set up a business case to assess the potential regarding cost reduction. Three guiding questions can help during the business case. First, which process steps capture the current buying process for purchases of type 3? If the essential users still send a need request and the B2B buyers request it at their well-known suppliers, then firms can benefit from a cloud system. Second, what are the costs of process steps such as requesting the need at the procurement department, searching for suitable suppliers, and requesting at the suppliers? Through this, firms can calculate the cost reduction for a single purchase. Third, how many purchases of type 3 occur over one year and what is the frequency? Through this, firms can assess the magnitude of the cost reduction.

This study reveals that firms usually do not implement cloud systems just for the purchase-to-pay process. They implement the whole system and incrementally approaching the different purchase types. B2B buyers facing purchases of type 1 (i.e., a new product buying situation for a category of goods with low importance) aim to achieve a cost reduction with lean processes, transparent processes, and continuous processes. In this context, the first recommendation is that firms should assess the potential of cloud systems regarding purchases of type 1. If many requests exist, cloud systems lead to a cost reduction during the source-to-contract process. However, when new requests of categories of goods with low importance infrequently occur, the cost reduction is rather low. For this special situation, B2B buyers can use cloud systems to eliminate the source-to-contract process for purchases of type 1, resulting in lean processes and an overall cost reduction. We recommend searching for suppliers that provide purchases of type 3, such as office equipment and furniture, but additionally, offer the service to manage highly specialized requests. Through this service, B2B buyers outsource the source-to-contract process to the suppliers.

For purchases of type 4 (i.e., an existing product buying situation for a category of goods with high importance) the underlying conditions are also transparent processes, lean processes, and continuous processes but the outcomes are manifold. First, these conditions lead to a cost reduction. For example, instead of catalogs, contracts exist for products such as gears. B2B buyers can purchase these products directly over the cloud system. Hence, we recommend firms to set up a business case to quantify the potential cost reduction.

Second, cloud systems lead to time savings during the final "performance feedback and evaluation" (step 7). The outcome results due to transparent processes. This study reveals that cloud systems have a function to create workspaces for each supplier. We recommend B2B buyers to implement workspaces for relevant suppliers and invite all involved parties from both the buying side and supplier side. Moreover, B2B buyers should prompt all parties to upload necessary information regarding each supplier in the individual workspace. The centralization of the information leads to time saving, because the responsible B2B buyer can evaluate the performance of these suppliers much faster.

Furthermore, cloud systems enable resource access, especially during the initial "need identification" (step 1) resulting from transparent processes. We suggest that B2B buyers integrate planning systems such as vendor managed inventory systems in the cloud to enhance supplier integration and information exchange. Information includes inventory data from the suppliers and production data as well as needs from the buying firm. Higher transparency improves the relationship. This might be due to the access to necessary resources that both partners can use to adapt to each other's requirements.

In comparison to the other three types of B2B buying processes, our results reveal that cloud systems are less suitable for B2B buyers facing purchases of type 2 (i.e., a new product buying situation for a category of goods with high importance). But still, some areas of application lead to resource access and time savings. Both outcomes appear during the source-to-contract process. For instance, when searching for potential suppliers, B2B buyers set up tenders. Some cloud systems in procurement already use artificial intelligence, such as chatbots to provide additional information during the tendering process. This information can help new employees to accomplish even difficult procurement situations without asking experienced colleagues for advice. However, these chatbots only work when they have access to predefined information.

Thus, we recommend that B2B buyers that face purchase of type 2 to work together with engineers and the IT department to define this information and program the chatbots. Effects are knowledge transfer from experienced B2B buyers to the new generation of employees. Additionally, higher autonomous working increases the procurement process efficiency leading to time savings.

Our last recommendation for B2B buyers facing purchases of type 2 addresses the result that cloud systems are not suitable for the complete source-to-contract process. We suggest B2B

buyers to assess their requirements towards individualized working. The reason is that the current cloud systems have limited functionality and therefore they are not suitable for highly complex procurement situations such as purchases for type 2.

Finally, a requirement to achieve the four underlying conditions (lean processes, usability, transparent processes, and continuous processes) is to have suppliers that can integrate themselves in the processes of the B2B buyers. The following statement supports this conclusion:

"Speed (…) depends on whether the two business partners are able to integrate directly and avoid media breaks and process breaks." (Expert 10)

This ability to integrate seamlessly to other processes and systems is called interoperability (Gartner 2020b) and can be expressed by digital readiness. Thus, we recommend B2B buyers to consider digital readiness during the supplier identification and selection.

Besides the managerial implications for B2B buyers, our study shows some recommendations for suppliers. Starting with suppliers that provide products of type 3. B2B buyers facing a purchase of type 3 aim to achieve an operational partnership with a logistical integration. The business relationship is based on quantity and frequency, with the overall aim to reduce cost. The results reveal that the success factors are continuity and consistency regarding the arranged data such as quality and delivery time. Hence, we recommend that suppliers always refill their stock for these products. Moreover, suppliers could anticipate periods where more products are requested based on existing sales data.

Our next recommendations address suppliers for products of type 1. First, the results suggest that suppliers should create an extensive profile on the cloud platforms from the B2B buyers. On the one hand, a comprehensive profile improves the identification of suitable suppliers, which again saves time and cost for the B2B buyers. On the other hand, it enables suppliers to meet new potential customers, which could lead to additional sales.

Second, our study reveals an opportunity for suppliers of products of type 1 and type 3. By offering an additional service to manage specific requests from B2B buyers, suppliers can pre-empt online firms such as Amazon or Alibaba. Furthermore, the suppliers become more valuable or even strategic relevant. This position helps during annual supplier meetings, where B2B buyers renegotiate, for instance, commercial conditions.

For suppliers that provide products of type 4we recommend being open-minded for cloud systems and functions such as workspaces. B2B buyers use workspaces during the "perfor-

mance feedback and evaluation" to reduce the time for non-productional tasks such as collecting all feedback. Therefore, long-term buyer-supplier relationships arise, because B2B buyers gain time for value-creating activities such as supplier relationship meetings

Finally, our study reveals that B2B buyers use cloud systems less for purchases of type 2 and interact with suppliers on a more personal basis. However, we recommend suppliers of type 2 not rejecting cloud systems completely. In fact, cloud systems support some interactions between B2B buyers and suppliers during the source-to-contract process. The aim of B2B buyers is to reduce costs and create transparency. If suppliers are not adapting to the digital processes of the B2B buyers, they minimize the cost reduction. In other words, being open-minded for new technologies and adapting to processes shows digital readiness enhancing long-term relationships.

The study also shows that digital readiness is a new supplier selection criterion. Especially for purchases of type 3 and type 1 that are *"low in price, but (...) very high in process costs"* (Expert 10) a supplier´s ability to integrate into the processes of the B2B buyers is crucial. The following example from an expert underlines this conclusion:

"When I´ve found a supplier that (…) sends me paper invoices for such low-value products, this will take me another two hours in the accounting department for approval processes, booking processes etc., then I´ve gained nothing" (Expert 10).

We recommend suppliers to invest in technology to improve their digital readiness. The reason is that suppliers that can be integrated easily lead to a long-term cost reduction for B2B buyers. Lower prices only have a short-term cost effect. Especially for products of type 3, such as office equipment, B2B buyers are more price-sensitive, but through the new criterion, the price sensitivity decreases.

5.3. Theoretical Contribution, Limitations, and Future Research

Our study contributes to theory in several ways. Even though this study does not reveal the use of community cloud computing, it highlights that cloud systems have different areas of application along the B2B buying process to integrate suppliers. Due to our collective consideration of all three concepts, we extend the academic research that finds cloud applications of cloud systems for single B2B buying process steps. Moreover, this is a good starting point for other research projects. They could investigate the effects of cloud systems for single process

steps or consider exploring the areas of application of other emerging technologies such as predictive analytics within B2B buying.

Besides, the consideration of the complete B2B buying process also allows me to contribute to the information system management literature. Prior research has analyzed the overall motives and risks of cloud computing. We extend this research area by providing a more sophisticated view. First, we find that some motives and risks differ regarding the B2B buying process steps, whereas others are general. Second, our study reveals that data security is still a concern, but the degree of concern is lower than three to five years ago. Furthermore, the concern of data security differs regarding the buying situation and the importance of the category of goods. Our study also contributes to the existing literature by providing evidence that the motives and risks of cloud computing change over time.

The next contribution of our study is that we strengthen the theoretical foundation of research on cloud computing in procurement by applying the RBV and TCE. Both grand theories from management support the use of cloud systems in B2B buying to integrate suppliers. When B2B buyers and suppliers interact through cloud systems relationship-specific investment occurs. These investments in relationships reduce transaction costs due to less uncertainty and a high frequency of transactions. Moreover, the integration of suppliers provides both partners access to resources that can become an opportunity for differentiation and protection against imitation.

Finally, our study also contributes to theory by supporting the concept of the B2B buying process. On the one hand, our findings provide further empirical evidence for the practical applicability of this theoretical concept. On the other hand, our study reveals that practitioners in procurement think in two processes. First, the operational procurement or procure-to-pay. Second, the strategic procurement, including the source-to-contract process. To the best of our knowledge, this study proposes a very first idea to link the theoretical and practical view of B2B buying processes. Thus, our study strengthens the importance of the collective consideration of theory and practice when investigating B2B buying.

As in any empirical research, this study comes with several limitations, which open up meaningful areas for future research. Since our study has an exploratory design, we propose propositions rather than testing hypotheses (Atteslander 2000). Therefore, an essential next step is to investigate our propositions in a larger survey with quantitative-empirical data.

Furthermore, as with any qualitative study, alternative explanations regarding the areas of application of cloud systems as well as for the related motives and risks might exist. The question is whether our results, which appear from 14 expert interviews are also valid for other settings. Future research should analyze other firms and industries to confirm the robustness of the results.

Additionally, the experts of this study are all from the buying side. Even though the risk supplier-related problems give first insights that suppliers may have different opinions regarding cloud systems, our study does not allow any detailed conclusions regarding the suppliers. Thus, we suggest that further researchers should include the perspective of suppliers. This could reveal whether suppliers experience the same areas of application of cloud systems to enhance the integration. Moreover, such further studies could test if suppliers are aware of similar motives and risks.

Next, our results show that CCC does not appear in B2B buying processes. This may result due to the fact that the experts of our study use cloud systems to integrate suppliers, rather than using the actual concept of CCC. Private cloud and public cloud are the established cloud models according to our experts. Further research should identify firms that explicitly mention the use of community cloud computing in procurement.

Although our study indicates that motives and risks can change over time (e.g., data security), it reaches its limits to assess how they develop within the next years. Due to constant technical progress, we believe that cloud computing will develop over time as well. Hence, we encourage future researchers to use longitudinal qualitative data to investigate if current motives and risks change or if even new ones appear.

Finally, the interpretation of our findings and the recommendations are strongly related to the four types of B2B buying processes (see figure 2). The results reveal that the manifestation of B2B buying processes depends on the buying situation (i.e., new or existing) (Robinson, Faris, and Wind 1967) as well as on the importance of the category of goods (i.e., low or high). However, other established classifications exist, such as the business-type approach from Backhaus (1998) or Subramaniam and Shaw (2002), who characterize B2B processes by the type of process and complexity of the process. Further research should investigate if the use of other classification approaches reveals similar findings.

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Diskussionspapiere des Instituts für Organisationsökonomik

Seit Institutsgründung im Oktober 2010 erscheint monatlich ein Diskussionspapier. Im Folgenden werden die letzten zwölf aufgeführt. Eine vollständige Liste mit Downloadmöglichkeit findet sich unter http://www.wiwi.uni-muenster.de/io/de/forschen/diskussionspapiere.

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Nicolas Henn/Todor S. Lohwasser
Juni 2020

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