

# Value Co-creation through Network IT Alignment: An Empirical Examination in Regional Networks

*Full Paper*

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## Abstract

IT alignment in intra-organizational contexts has been recognized as an important factor of organizational performance. This paper takes up this stance and translates it to the network level. In order to explain the role of IT in value co-creation, a theoretical model investigating the interconnection between IT alignment in inter-organizational networks and collaboration success is being developed. Moreover, the mode of governance is identified as an important antecedent to network IT alignment. An empirical study is conducted including answers from 165 regional network organizations in Germany. The results give support for the assumption that network IT alignment, first, contribute to the value co-creation in inter-organizational collaboration, and second, can be better achieved by networks with a centralized governance mode. In doing so, this study contributes to the emerging field that tries to understand the role of IT in the functioning of inter-organizational networks.

## Keywords

Inter-organizational networks, inter-organizational IT alignment, network alignment, network performance.

## Motivation

Without a doubt, inter-organizational collaboration in network arrangements play a decisive role in today's business. Co-creation, co-development, and co-innovation promises companies to reduce their costs, create greater efficiencies in the use of resources, and better services for clients and customers (Alter and Hage 1993; Huxham and Vangen 2005; Provan and Kenis 2008). Information and communication technologies play a decisive role in the functioning of those networks. For instance, regional innovation networks develop new products using distributed innovation tools (Thomke 2006), automotive networks orchestrate their supplier and distribution channels with supply chain management solutions (Graham and Hardaker 2000), and payment networks coordinate billions of transactions on their common platforms (Provan and Kenis 2008).

In the context of IT value creation, research and practice both have recognized the importance of IT alignment, which refers to the fit of business as well as IT and has been identified as an important factor of organizational performance (Byrd et al. 2006; Chan et al. 1997; Cragg et al. 2007; Karahanna and

Preston 2013; Kearns and Lederer 2003; Sabherwal and Chan 2001). A recent study by Kappelman et al. (2014) underlines the practical relevance of IT alignment and ranks it as the number one concern of all top IT management worldwide. In the context of inter-organizational networks, firms can maximize the efficiency, effectiveness, and synergies of IT resources by aligning business and IT domains and thus benefiting from the advantages of inter-organizational IT systems (Kim et al. 2013; Seggie et al. 2006). However, although IT alignment is still a challenging task to single firms, it seems to be even more challenging to inter-organizational networks because complex interdependencies between organizations have to be managed, resulting in additional issues like compatibilities, accountabilities, and opportunistic behavior (Derzsi and Gordijn 2006; Katzy et al. 2011; Pijpers et al. 2008; Provan and Kenis 2008; Tapia 2009; Zarvic et al. 2011).

In IS research, IT alignment has been a main research area for the last decades (Tallon and Pinsonneault 2011). However, research has mainly focused on IT alignment within firms (Chan and Reich 2007; Katzy et al. 2011; Tapia 2009). Although research has widely investigated IT-related capabilities in inter-organizational settings (Chen et al. 2013; Klein and Rai 2009; Prasad et al. 2013; Rai et al. 2012; Saraf et al. 2007), no study examined the capability of aligning inter-organizational business and IT. So far, research on inter-organizational IT alignment has been limited to dyadic supply chain relationships (Chen et al. 2011; Kim et al. 2013; Sanders 2005; Seggie et al. 2006; Wu et al. 2006), conceptual frameworks (Derzsi and Gordijn 2006; Tapia 2009; Zarvic et al. 2011), or case studies (Katzy et al. 2011; Pijpers et al. 2008, 2011). To the best of our knowledge, no study examined the impact of IT alignment on network success to prove its relevance or investigate its contributing factors.

To address the present gap in the literature, we aim to answer the following research question, how can inter-organizational networks profit from IT by aligning networks and IT processes. Building upon this, we developed a theoretical model that investigates the link between inter-organizational IT alignment and network success. In addition, we investigate the role of network governance in this context, which should be a significant factor for achieving IT alignment through the coordination and integration of network activities.

The remainder of this paper is structured as follows. In the next section, we define inter-organizational networks and discuss a framework of network processes. Furthermore, we set the background of IT alignment from an intra- and inter-organizational perspective. Afterwards, the research model is presented, which includes the design of a measurement instrument of network IT alignment and corresponding hypotheses. The design of the survey is outlined in the next section. Results of the study are then presented. The study closes with a discussion and conclusion.

## **Theoretical background**

### ***Reviewing inter-organizational network management***

Our understanding of inter-organizational networks follows the definition of Camarinha-Matos and Afsarmanesh (2005): Interorganizational networks consist of a variety of organizations that are largely autonomous, geographically distributed and heterogeneous in terms of their operating environment, culture, social capital, and goals. Furthermore, they collaborate in order to achieve common or compatible goals and their interactions are supported by computer networks. More specifically, the collaborations comprise of economic activities that are coordinated repeatedly in time and space (Ring and Van de Ven 1992). Inter-organizational networks can further be subdivided into goal-oriented networks, which are either opportunity driven or aim continuous production (Camarinha-Matos and Afsarmanesh 2008). In our research, the focus is on production-oriented networks.

When examining interorganizational networks, researchers have focused on various management issues, structural features, and perspectives as well as different classifications and dimensions (Lamming et al. 2000). Hence, the academic literature provides a large variety of network management frameworks that support the perspective of collaborating organizations in inter-organizational networks (e.g. Möller, 2006; Sydow & Windeler, 1994; Wohlgemuth, 2002; Zundel, 1999). Those approaches basically vary by scope, detail, level of analysis, and point of view. However, for this work we rely on the framework proposed by Sydow & Duschek (2011) for primarily two reasons. First, it has already been successfully applied in quantitative network research (Landsperger and Spieth 2011; Möller 2006), and second, the framework con-

centrates on the elementary tasks of collaboration across organizational boundaries in networks, which allows the identification of crucial network processes. This underlying framework revises initial work in the area of network management (Sydow and Windeler 1994) and highlights four essential network management functions, namely selection, allocation, regulation, and evaluation. Accordingly, the first aspect of network management deals with the basic design of the network and covers the selection process of network partners, collaboration domains, or network boundaries. The selection's management task also includes the constantly reviewing of inter-organizational relationships in order to overcome a potential mismatch of partners and to add or remove partners of the network (Sydow and Duschek 2011). Secondly, the allocation process encompasses the allocation of tasks, resources, and responsibilities within the existing network structures. This function ensures that tasks are allocated to organizations that apply to their core capabilities, which is critical to network settings in order to make use of complementary resources and competences (Sydow and Duschek 2011). The third management function concentrates on the fundamental aspect of establishing basic rules and procedures for inter-organizational collaboration, such as the development of allocation mechanism in order to enhance knowledge sharing and to avoid conflicts. Further examples of such regulative activities are the establishment of incentive systems and the definition of clear roles and responsibilities for all parties involved in a network (Sydow and Duschek 2011). Finally, the evaluation process deals with the review of the aforementioned management functions within the network. Thus, its primary objective is the supervision of all selection-, allocation-, and regulation processes in order to provide information on the relation between the associated costs and benefits of collaboration on a regular basis. Moreover, this process monitors the contribution of partners, and thus ensures transparency to network organizations and serves as a prevention against opportunism (Sydow and Duschek 2011).

When studying integration across organizational boundaries the literature often takes the perspective of business processes, since they are a powerful tool for analysing organizational issues (Garvin 1998). An overview of network management processes associated with the four management functions discussed above can be found in the appendix. This framework of crucial network processes serves as the basis for our measurement instrument.

### ***Reviewing IS support in inter-organizational networks***

Collaboration between organizations in inter-organizational networks is not a new phenomenon. However, the continual progress of information- and communication technologies is a catalyst and enabler for collaboration across organizational boundaries. Particularly, inter-organizational information systems (IOS), defined as integrated IS shared by two or more organizations (Barrett and Konsynski 1982), can be seen as the main driver for collaboration in networks, as they link customers, suppliers and other network members, and thus play a fundamental role in the functioning of those networks (Chi et al. 2007). Due to the dynamic and often temporary nature of inter-organizational networks, the distinct stages of their lifecycle are typically considered: Initialization and partner selection, decision and setup, production, development and closure (Camarinha-Matos et al. 2009; Zajac and Olsen 1993). According to these phases, various IOS support different tasks within the network and offer assistance for the execution of network management functions. A selection of systems assigned to the different stages of the network and the associated management functions are depicted in Figure 1.

The first two stages of the network lifecycle deal with the strategic planning and initial incubation of the network as well as with the constitution and start up. In this phase, IOS facilitate the strengthening of inter-organizational relationships and support the creation and formation of networks rather than their operation. For example, during this stage IOS particularly offer support for the selection of potential network members by providing partner databases and efficient search mechanisms through the electronic configuration of contracts. The production stage is the regular phase of the network existence. During this stage, only small changes in membership take place, but both the definition and adaption of roles and operating principles lead to the evolution of the network. Thus, in this stage, IOS primarily support the allocation of resources as well as regulation activities. Some examples are systems for efficient order processing, distributed production and development. The last stage represents the cessation or metamorphosis of a network. During this stage IOS offer support for reallocation and re-regulation through knowledge databases and other help systems, and thus enable major changes in network objectives, principles, and memberships (Camarinha-Matos et al. 2009).

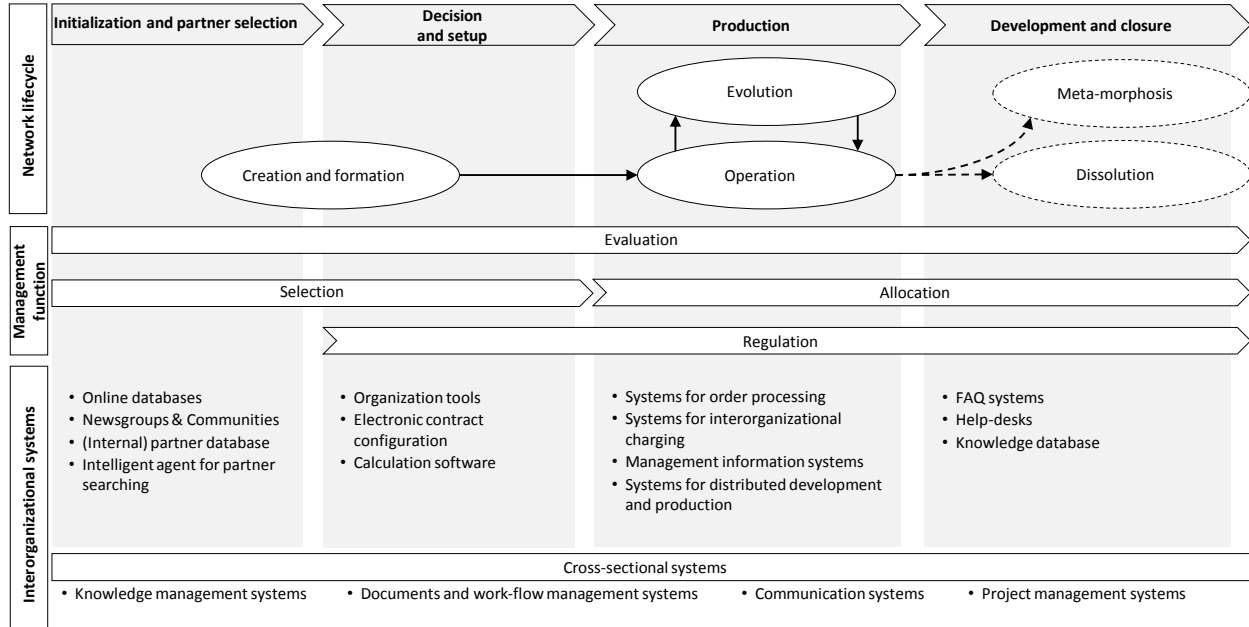


Figure 1. IS support in inter-organizational network tasks

## Research Model

This study addresses the question of how IT resources lead to collaboration success in networks, and how the mode of network governance enables network IT alignment. We will therefore develop a research model (Figure 2) that links the fit of network management processes (MP) and IT support to collaboration success. Furthermore, we include the mode of network governance, i.e., a centralized vs. a decentralized mode, as predictor for high network IT alignment and collaboration success.

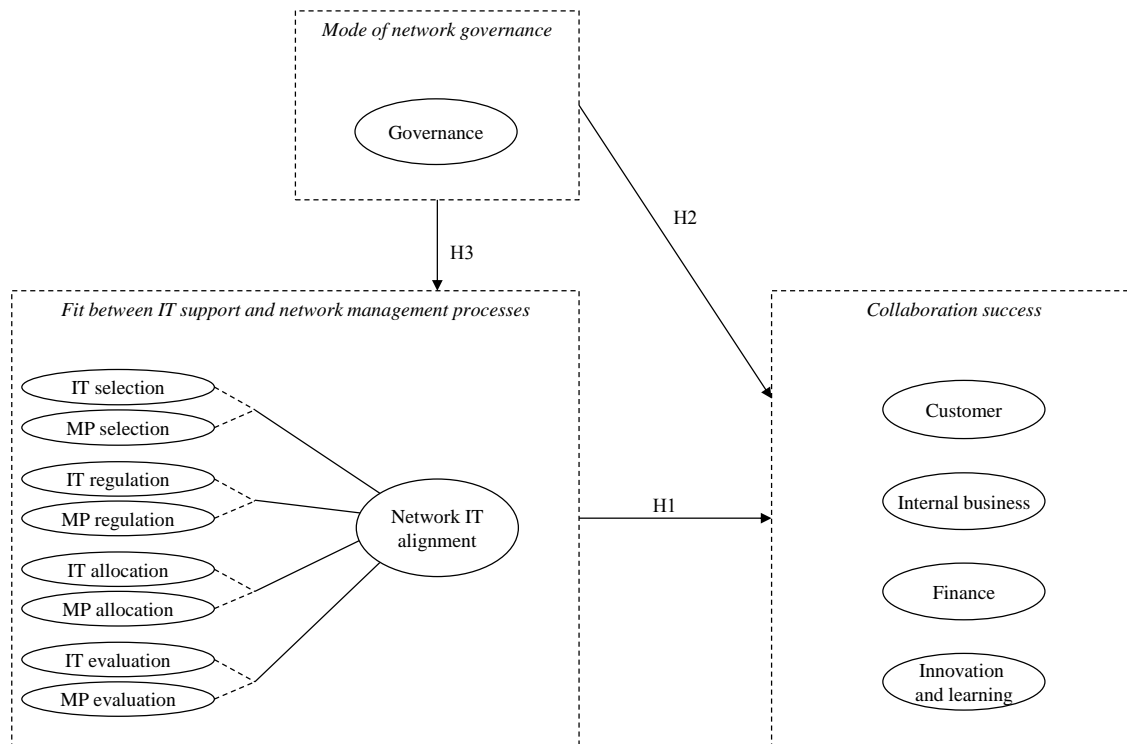


Figure 2. Research model

### ***Fit of IT support and network management processes***

Information technologies play a critical role for the functioning of inter-organizational collaboration as they “provide the capacity to operate within the network of relationships. (Grant and Tan 2013)” Inter-organizational IT, such as collaborative portals and platforms or supply chain systems, facilitate collaboration between firms (Sambamurthy et al. 2003), potentially increasing the efficiency, speed, innovation, and quality of inter-organizational activities (Chi and Holsapple 2005). However, as often repeated in IS literature, IT investments per se do not necessarily lead to sustained value.

Research on intra-organizational alignment argues, that the functional integration of business processes and IT mediates the impact of investments in IT and performance gains through IT (Chan and Huff 1997; Melville et al. 2004). Henderson and Venkatraman (1993) describe this as “[...] the need to ensure internal coherence between the organizational requirements and expectations on the one hand, and the delivery within the IS function, on the other hand.” Numerous studies took this perspective of fit between business processes and IT resources and examined the influence of the functional integration on organizational success measures (Byrd et al. 2006; Chan et al. 1997; Cragg et al. 2002). Consistently, the results show that value gains through IT are mainly realized by close integration with the business side. We argue that this basic relationship between IT and performance also holds in the network context. IT resources contribute to the value creation in their support of business processes. In other words, the deployment and usage of IT itself does not guarantee value contribution. It is rather the supporting role of IT of network management processes that derives value from IT usage. We therefore posit that:

**H1:** The fit between IT and network processes positively influences collaboration success.

### ***Mode of network governance***

Working together to achieve a common goal in an inter-organizational network requires coordination between partners and therefore management of common activities and interdependencies (Hess 2002; Riemer and Klein 2006). The purpose of structural management is to identify and analyze common tasks, roles of employees, and structural linkages towards a final design of inter-organizational processes (Riemer and Klein 2006). Inter-organizational processes are crucial to the coordination between network partners and refer to the control, operation and support of common activities as well as interaction processes (Wohlgemuth 2002). Network members thus have to integrate internal and network processes, align organizational structures, cultures, products, services, and coordinate employees (Riemer and Klein 2006). Provan and Kenis (2008) classify network structures for decision making along the dimensions of whether the network governance may or may not be brokered. On the one hand, decision making processes are organized independently and interactions between organizations are bilateral structured, which results in a decentralized governance mode. On the other hand, highly brokered governance modes occur through a single point of contact, such as a lead organization, a central network administration organization, or a committee.

A brokered governance mode bears advantages and is also important for accomplishing an alignment between network processes and IS. Achieving inter-organizational IT alignment requires a high level of coordination between network partners because complex interdependencies between network partners have to be managed (Tapia 2009). In this situation, network-level competencies and skills are required which can be better provided in central governance forms – for example by an organization which is specialized on network-level tasks – than in decentralized governance structures (Provan and Kenis 2008). Furthermore, by having a decentralized governance mode, organizations act more in their self-interest and are not as concerned about decision implications outside their organization (Samaddar et al. 2006). In contrast, in a centralized governance structure, decisions are more likely made in order to create benefits at the network level, resulting in better aligned processes and collaboration success. This also leads to a higher level of knowledge sharing between network organizations (Samaddar et al. 2006), which is crucial in inter-organizational networks and has been identified as an important antecedent to networks’ success in various studies (e.g. Chen, Preston, & Xia, 2013; Dyer & Hatch, 2006; Im & Rai, 2008; Saraf, Langdon, & Gosain, 2007). Furthermore, network organizations need knowledge about their partner’s processes and IT systems to successfully align them (Zarvic et al. 2011). Consequently, an increased level of knowledge sharing in a centralized governance structure facilitates the understanding and synchroniza-

tion of network processes (Chi and Holsapple 2005; Klein and Rai 2009), thus leading to a better fit of network and IT processes at the network level.

Consistent with our argumentation we therefore posit:

**H2:** Networks with a brokered governance mode outperform networks with a non-brokered mode in terms of collaboration success.

**H3:** Networks with a brokered governance mode show higher degrees of an alignment between network processes and IS.

## Methodology

### *Operationalization and calculation of the variables*

The operationalization of the research model covers three areas: measurement of network IT alignment, measurement of collaboration success, and operationalization of mode of governance.

We decided to measure network IT alignment following a widely recognized procedure published in Chan et al. (1997). Accordingly, IT alignment can be operationalized as the fit between processes and IT. In order to measure the importance of network processes, we adapted scales for selection, allocation, regulation, and evaluation from Möller et al. (2006), (Sydow and Duschek 2011), and Landsperger and Spieth (2011). The question seeks to rank the relevance of each process on a scale ranging from 1 (not important) – 7 (very important). Building upon these network processes, we derive measures for the corresponding IT support and ask to state the degree of support, also ranging from 1 – 7. Our conceptualization of fit between network processes and IT follows the moderation approach (Venkatraman 1989). We thus multiply the values of the network process levels of importance with the values of their corresponding IT support and receive alignment scores at the item level. Accordingly, a low score indicates a low alignment, while a high score indicates a high alignment.

We decided to measure collaboration success in networks following Bode et al.'s (2011) suggestion and distinguish 10 target dimensions, which are grouped in four perspectives: customer (increase in flexibility and adaptability, increase in responsiveness, offering new or improved products, access to new markets), internal business (Access to additional resources, concentration on own core competencies), finances (decrease in operating costs, decrease in business risks), and innovation and learning (development of collaborative core competencies such as inter-organizational learning, Obtaining new knowledge). Furthermore, each target dimension was measured with two items. The first item evaluates the strategic relevance of a given target dimension for the organization's business model and serves as a weighting factor, while the second variable measures the perceived target achievement. The success score of each target dimension is defined as the multiplication of strategic relevance and target achievement.

Finally, we decided to measure the mode of governance following Provan and Kenis' (2008) suggestion and distinguish between networks with a centralized authority (network administration organization or lead organization) and networks without a fixed authority (shared governance).

### *Sample characteristics*

For this study, an online survey method was chosen. The link to the survey was distributed among organizations in Germany's networks. The underlying database builds upon Cluster Observatory, a database for regional networks managed by the Center for Strategy and Competitiveness at the Stockholm School of Economics. Survey invitations targeted executive managers responsible for the network collaboration. In total, 198 passed the filter questions that were asked to determine whether the participant works in a computer-supported network. After a second data screening process, 33 data sets had to be excluded due to quality criteria such as missing data, which finally resulted in 165 answers. The composition of the sample is described in Table 1.

Organization size	Number (%)	Organization type	Number (%)
Small, 1..49 employees	104 (63.0)	Enterprise	139 (84.6)
Medium, 50..249 employees	26 (15.8)	Research institution	9 (5.6)
Large, at least 250 employees	35 (21.2)	Non-profit organization	6 (3.7)
		Public / Gov. institution	10 (5.2)

**Table 1. Sample characteristics**

## Results

Before beginning the model analysis, we check the survey data for the thread of non-responses and common method bias. The research model is then tested using structural equation modeling with PLS. We argue this decision for a variance-based model estimation instead of covariance-based because PLS has a fewer demands for sample size and excels at prediction. The analysis is primarily supported using the software SmartPLS 2.0 (Ringle et al. 2005).

### *Non-response bias and common method bias*

Low return rates are typical for this kind of email based surveys (Preston and Karahanna 2009). However, low response rates bear the risk of non-responses. We therefore compare mean values of answers of the first third and the last third of the sample (Armstrong and Overton 1977). It can be argued that late respondents are similar to non-respondents. A t-test revealed non-significant differences (at a significance level of  $p < .05$ ). This indicates that non-responses are not a major threat for this study.

Our study design adopts a single-informant approach. Accordingly, the threat of common method bias exists, as the same participant answers both exogenous and endogenous variables in our research model. In order to examine this effect, we used Harman's single factor test and ran an exploratory factor analysis. First, not a single factor emerges from the data; second, a general factor does not capture a high share of the variance. Therefore, common method bias should not be a concern in our analysis.

### *Measurement model*

We modelled IT alignment as a reflective-reflective higher-order construct, which is consistent with the system-level approach for IT alignment published in Chan et al. (1997). We used a two stage procedure as described in Ringle et al. (2012) for handling higher-order constructs in PLS methodology. All other constructs were modelled as unidimensional reflective constructs.

Construct	FL	CR	AVE	1	2	3	4	5	6
1. Customer	.695-.877	.863	.614	<b>.784</b>					
2. Internal business	.785-.831	.790	.654	.525	<b>.808</b>				
3. Finances	.920-.942	.929	.868	.433	.450	<b>.932</b>			
4. Innovation	.798-.962	.876	.781	.423	.438	.306	<b>.883</b>		
5. Network IT alignment	.900-.923	.955	.841	.462	.446	.500	.407	<b>.917</b>	
6. Governance mode	n.a.	n.a.	n.a.	.029	.054	.027	.070	.101	<b>n.a.</b>

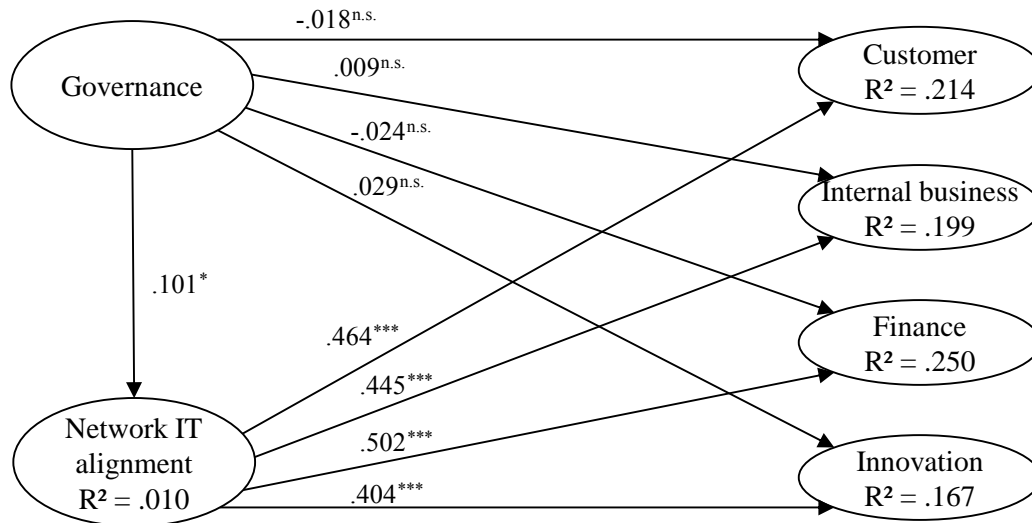
**Table 2. Factor loadings, composite reliability, average variance extracted, and inter-construct correlations**

In order to examine how well the model fits the empirical data, we considered convergence, and discriminant validity. For the reflective constructs, we examined convergence validity by checking for individual item reliability, composite construct reliability (CR), and average variance extracted (AVE). On one item, the customer scale revealed to have a factor loading of .695, all other factor loadings exceeded .70, indicating good reliability (Gefen and Straub 2005). The model also passed the test for internal consistency, with a CR above .70 (Hulland 1999). In addition, the AVEs exceeded the lower bound of .50 (Bhattacharjee and

Premkumar 2004). We then checked for discriminant validity. Checking for cross-loadings, it holds in our model that all items have the highest loading on their factor than on any other construct. Moreover, following the suggestions of Fornell and Larcker (1981), we computed the square root of the AVEs. For each construct, this value exceeds the correlations shared with the other constructs, indicating discriminant validity. Consequently, we argue that our measurement model can be used for further structural analyses.

### Structural Model

For assessing significance levels of the structural model, we used the bootstrapping re-sampling method and created 1000 samples. Figure 3 presents the estimates of the PLS analysis and the significance levels of the bootstrapping. When interpreting the explained variance, acceptable levels depend on the research context (Hair et al. 2011). The structural models in this study can explain of .167 to .250 of the variance in the dependent performance variables. Compared to other studies on IT alignment and IT integration these results can be regarded as average (e.g., Chen et al. 2011; Rai et al. 2006). The data support H1, i.e., network IT alignment positively and significantly influences all four dimensions of collaboration success ( $p < .10$ ). The analysis also reveals that a centralized governance mode positively and significantly influences network IT alignment, which gives support for H2 ( $p < .01$ ). However, the data does not support H3 and shows no significant direct effect of the governance mode on the collaboration success measures ( $p > .10$ ).



**Figure 3. Results of the structural model estimations**

n.s.  $p > .10$ , \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$

### Discussion

The paper aims to contribute to the understanding of how organizations in inter-organizational networks can profit from IT. Therefore, a research model has been developed that posits a link between the alignment of network processes and IT with collaboration success. Moreover, it was argued that a centralized mode of network governance allows organizations to better achieve alignment and directly supports collaboration success. In order to test the hypotheses, a cross-sectional survey was conducted including 165 organizations in regional networks in Germany. Our results reveal interesting findings for both research and practices.

First, our expectation that a high degree of fit between network management processes and IT leads to collaboration success was confirmed with our data. This holds for better customer integration and improved internal business efficiency but also financial performance measures and better inter-organizational learning. Accordingly, network IT alignment can be interpreted as an important capability for organizations to gain value through inter-organizational collaboration. Our findings give insights into



the question of how networks can derive value from inter-organizational IT. This particularly contributes to research on value co-creation and IT. While often a positive influence of inter-organizational IT integration and relational value is assumed (Benitez-Amado and Ray 2012; Bharadwaj et al. 2007; Chang et al. 2008; Rai et al. 2006; Rajaguru and Matanda 2009), the perspective of how integration leads to success is seen as a black box. Our results firstly give insights into the process of how investments in inter-organizational IT can lead to collaboration success.

Second, we argued that networks with a centralized governance mode can better achieve network IT alignment between their network processes and their IT. The data supports this hypothesis. Networks with a centralized mode of governance have on average higher alignment levels. An explanation for this effect can be the higher degree of coordination in centralized networks. For example, Human and Provan (2000) describe networks in the wood processing industry, which are governed by a centralized network administrative organization. This formal organization offers the platform for all members to negotiate on common goals, rules of collaboration and common initiatives. Under these circumstances, it is plausible that coordination of business needs, regarding IT support, can better be realized and, thus, implementations of common IT become more likely. However, since the effect of the mode of governance is rather weak in our data, more research is needed in order to better understand how they are both related.

Third, for practitioners the results show that inter-organizational business processes and IT should not be managed in isolation. Despite the potential advantages of inter-organizational IT, IT-related investments per se will not necessarily lead to competitive advantage nor business value for network partners. It is rather important to pay close attention to how IT fits into the inter-organizational infrastructure and processes, and vice versa. In achieving this fit, network partners can realize superior benefits from IT-related investments. Practitioners, for example, can also use this tool for diagnosing misalignment at the process level and to benchmark their overall performance at the systems level.

Of course, the results and suggestions of this study must be interpreted with caution. As mentioned earlier, we decided to measure the fit between IT support and network management processes with the fit as moderation approach. Although this approach found wide acceptance in IT alignment research (Chan et al. 1997; Cragg et al. 2002), it may overestimate IT support as an influencing factor since a higher degree of IT support increases alignment independent from the process scores. Another approach for interpreting alignment is the so-called “Fit as Matching” approach, which is also suggested by Venkatraman (1989). This approach defines misalignment as the summed scores of the Euclidean distances between a pair of variables. Analyses using the “fit as matching” approach with this data set revealed similar results. This is in line with earlier studies on intra-organizational IT alignment that could not show good empirical support for this concept of fit (Cragg et al. 2002, Hoffman et al. 1992). Moreover, we used cross-sectional data to determine the effect. It would be interesting to conduct a longitudinal study to receive insights into the lagged influence of governance mode and IT alignment on collaboration success over time. Finally, as it is typical in empirical studies, which concentrate on a specific region, there is also a problem of generality. Our sample consists of networks from Germany. Of course, country specific factors such as cultural differences may influence the results; therefore, drawing conclusions from the results should be made with caution. Further studies should show the validity in different contexts.

While this research gave important insights to the question of how IT supports inter-organizational networks and how it affects collaboration success, it also provides some interesting opportunities for future studies. Pointing in the direction of governance and IT in networks, the question of whether a high degree of network IT alignment is always desirable, arises. Das and Teng (2000) describe networks in their tension between rigidity and flexibility, and see the dynamic responsiveness to changing conditions as one of the huge advantages. However, high degrees of alignment impede strategic flexibility since related technological investments provoke lock-in effects (Chan et al. 1997). Building on the results of this study, future research can investigate causal explanations on how network IT alignment refers to network level outcomes. Finally, this research identified one important driver of network IT alignment, i.e., the network governance mode. However, our results also underline that there is a lot more room for explanations. Future research should seek to identify further mechanisms on how networks align their common management processes with IT.

## Appendix

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### Operationalization of the variables and questionnaire items

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Each of the following network management processes were rated for the process importance (“please quantify the strategic importance of each of the following network management processes”) and the respective IT support (“please quantify how well the network wide IT support each of the following network management processes”). The items on the scale are derived from Möller et al. (2006), Sydow and Duschek (2011), and Landsperger and Spieth (2011).

<b>Selection</b>	Select and manage network partners Define and manage collaboration scope, targets, and strategies Recruit and manage network personnel Select and manage collective investments
<b>Regulation</b>	Define and manage rules of collaboration Define and manage incentive systems Define and manage conflict resolution procedures Define and manage inter-organizational information systems Define and manage knowledge management systems
<b>Allocation</b>	Plan own requirements for external network resources Negotiate and agree on inbound network transactions Fulfil inbound network transactions Plan external demand for own network resources Negotiate and agree on outbound network transactions Fulfil outbound network transactions
<b>Evaluation</b>	Evaluate and review network partners Evaluate and review collaboration scope, targets, and strategies Evaluate and review collective investments Evaluate and review network regulation Evaluate and review network planning Evaluate and review network agreements Evaluate and review network transactions

Each of the following collaboration success target dimensions were rated for both strategic relevance and target achievement. The scale is derived from Bode et al. (2011).

<b>Customer</b>	Increase in flexibility and adaptability Increase in responsiveness Offering new or improved products Access to new markets
<b>Internal Business</b>	Access to additional resources Concentration on own core competencies
<b>Finances</b>	Decrease in operating costs Decrease in business risks
<b>Innovation and Learning</b>	Development of collaborative core competencies (inter-organizational learning) Obtaining new knowledge

Participants were asked to select one of the three following answers according to their governance mode, i.e., decentralized governance (heterarchical governance) or centralized governance (hierarchy aligned to focal company or hierarchy aligned to central network organization). The scale is derived from Provan and Kenis (2008).

<b>Governance mode</b>	Is there a central entity in your network, which has operative control for the coordination of network activities? There is no central coordination entity Single organizations or institutions coordinate all network activities An independent network authority organization coordinates all network activities
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