EXAMINING IT ALIGNMENT IN INTER-ORGANIZATIONAL NETWORKS: DEVELOPMENT AND APPLICATION OF A MEASUREMENT INSTRUMENT

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EXAMINING IT ALIGNMENT IN INTER-ORGANIZATIONAL NETWORKS: DEVELOPMENT AND APPLICATION OF A MEASUREMENT INSTRUMENT

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Abstract

Business environments have been profoundly changed by emerging innovations in the field of information technology (IT). In addition, collaborative agreements, such as inter-organizational networks, have shaped modern economies. The field of intra-organizational IT alignment has shown that it contributes to the explanation of the functioning and value delivery of IT in an organizational context. This paper takes up this stance and translates it to the network level. The authors therefore develop a measurement instrument that examines the alignment of network processes and IT that aim to organize inter-organizational network collaboration. Furthermore, this instrument is then applied to the question of different governance modes and their influence on IT alignment. Since network governance plays an important role in the context of coordination and decision making, we propose that this is an important characteristic, which explains variance between networks. A study is conducted with respondents of 198 network organizations in Germany. The results support the validity of the measurement instrument and, moreover, show that networks with a centralized governance mode, indeed, better align IT with network processes. 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: IT alignment, inter-organizational networks, network governance.
1 INTRODUCTION

Increased competition, higher customer expectations, and environmental concerns are only a few among other forces that drive organizations to engage in complex inter-organizational network arrangements. This kind of collaboration promises to reduce 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). Although researchers spend much effort studying networks of organizations, “there is still a considerable discrepancy between the acclamation and attention networks receive and the knowledge we have about the overall functioning of networks” (Provan and Kenis, 2008). The question of functioning, however, is important in order to better understand differences in network-level outcomes.

Information and communication technologies play a fundamental role in the functioning of networks. They provide the capacity to operate within the network of relationships (Grant and Tan, 2013). For example, 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).

The question of the functioning of IT value creation is addressed in the research stream on IT alignment. Hereby, IT alignment refers to the process assuring the fit of business needs and the support through IT resources. Chan and Reich (2007) emphasize that “IT alignment is a management concern primarily because of its potential impact on firm performance”. Empirical studies have shown that high degrees of IT alignment are significantly correlated with organizational performance measures (e.g., Chan et al., 1997, Cragg et al., 2002), and that firms can reduce costs, or improve sales revenues and customer service, after raising their internal alignment (Chan et al., 1997). In the context of inter-organizational networks, a better understanding of the role and functioning of IT can contribute to the understanding of networks’ overall functioning.

The management of complex network arrangements differs from traditional organizational forms (Sydow and Duschek, 2011). Reasons lay in the high dynamics of networks, the negotiation rationality in decision making, and competing goals (Das and Teng, 2000, Osborn and Hagedoorn, 1997). Accordingly, reaching IT alignment in the context of networks is considered to be even more challenging than in the intra-organizational context (Wieringa, 2008). Translating the topic of IT alignment to the network level thus far found only little consideration in the IS literature (e.g., Zarvic et al., 2011). To the best of our knowledge there is no study explicitly examining degrees of fit of network IT alignment. However, this perspective is relevant, since a validated measurement instrument is a prerequisite for further analysis on antecedents and consequences of network IT alignment, which in turn contributes to the understanding of network’s functioning.

Therefore we pose the research question, how to conceptualize the operational fit between network processes and IT. Building upon this, we aim to develop a measurement instrument of network IT alignment. We also go one step further and apply this instrument to the question of different modes of governance and their influence on IT alignment. Since network governance plays an important role in the context of coordination and decision making, we propose that this is an important characteristic which explains variance between networks.

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 the proposition that the mode of network governance influences network IT alignment. The design of a following survey is outlined in the next section. Results of the study include answers from 198 network organizations and are then presented. The study closes with a discussion and conclusion.
2 RELATED WORK

2.1 Reviewing inter-organizational networks

The general term “network” is widely used in various domains and has many ambiguous meanings. Within economic science it refers to a certain organizational structure but also to a collaborative behavioural pattern (Newman, 2003). Following the latter interpretation, networks focus on relations between individual actors. Thus, networks can emerge between individual persons (e.g., social networks) or business units but also among separate firms. This paper concentrates on inter-organizational networks at the firm level. More specifically, our understanding follows the definition of Camarinha-Matos and Afsarmanesh (Camarinha-Matos and Afsarmanesh, 2005). Inter-organizational networks are composed of more than two organizations that are largely autonomous and geographically distributed. They are heterogeneous in terms of their operating environment, culture, and social capital. They collaborate to better achieve common or compatible goals, and their interactions are supported by computer networks.

Academic literature has introduced several network management frameworks that support the perspective of collaborating firms in inter-organizational networks (e.g., Sydow and Windeler, 1994, Zundel, 1999, Wohlgemuth, 2002, Möller, 2006). Those approaches primarily vary by scope, detail level, and point of view. For this paper, we choose Sydow and Duschek’s work (2011) over the others for two reasons. First, because it found wide consideration in the area of network research (an earlier version has been adopted by, e.g., Möller, 2006, Landsperger and Spieth, 2011); second, because it concentrates on the elementary tasks of collaboration and, thus, allows identifying crucial network processes. The framework of Sydow and Duschek (2011), which is a revision of Sydow and Windeler’s (1994) initial work, highlights four network management functions: selection, allocation, regulation, and evaluation. Among those functions no static chronological order is given and all functions represent coequal areas that are connected by continual and iterative management practices.

![Figure 1. Functions of network management (based on Sydow and Duschek 2011).](image)

The first area of Sydow and Duschek’s framework covers selection processes and focuses on the basic network design and its purpose. Selection, periodic approvals, as well as the de-selection of network partners and collaborative domains are the main tasks within this functional area (Sydow and Duschek, 2011). Secondly, allocation processes encompass the division of labour within existing
network structures. Thus the distribution and assignment of business activities to separate network members, and its capabilities, outline the general allocation process. Network allocation is primarily based on balancing demand and supply within the collaborative domain. As a consequence, market-orientated mechanisms, such as negotiations or auctions, are usually applied to coordinate mutual value creation most efficiently (Sydow and Duschek, 2011). Thirdly, regulation processes concentrate on another very fundamental aspect. Their target is the establishment of basic rules and standards for inter-organizational collaboration, such as the definition of allocation mechanisms. Additional regulative activities focus on incentive systems, knowledge management, and conflict resolution (Sydow and Duschek, 2011). Finally, the remaining evaluation function encompasses a broad set of business processes that review the aforementioned network practices retrospectively. Thus its primary objective is the supervision of selection, allocation, and regulation processes, and its unit of analysis can vary from single network transactions up to the legitimation of the entire network. In other words, network evaluation concentrates on the relation between benefits and costs of collaboration. Moreover, it provides transparency to network members and serves as prevention against opportunism (Sydow and Duschek, 2011).

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

Table 1. Overview of network management processes (derived from Sydow and Duschek 2011 and Möller 2006)

When studying cross-functional integration, literature often takes a perspective on business processes (Galbraith and Kazanjian, 1986). It is argued that they are a powerful tool for analysing organizational issues (Garvin, 1998). An overview of network management processes, which is derived from Sydow and Duschek’s descriptions extended with remarks from Möller (2006), can be found in Table 1. This framework of network processes will be used as starting point for the analysis of network IT alignment.

2.2 Reviewing Business-IT Alignment

The general idea of IT alignment, which is also commonly named as “business/IT alignment”, refers to the business-orientated usage of information technology, within an organization, to facilitate its
value creation. Originating in the organisational literature, the underlying assumption of alignment is that organizational performance is the consequence of the fit of two or more factors (Burns and Stalker, 1961). In business-IT alignment studies, this fit refers to the contingent relationship of the business and the IT domain.

A milestone in business-IT alignment research has been laid out by Henderson and Venkatraman (1993) who provide a distinction of IT alignment perspectives. Their strategic alignment model identifies dependencies on the strategic and operational level for both business and IT side. The latter represents the “functional integration” of business and IT, which aims to an overall improvement of the business model. 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 those alignment perspectives and examined the influence of the functional integration on organizational success measures. As one of the first empirical studies, Chan et al. (1997) found a link between IS strategic alignment and business performance in North American financial services and manufacturing firms. Similar findings are reported by Cragg et al. (2002) for small enterprises in the UK, as well as Byrd et al. (2006) who additionally suggest that IT alignment moderates the relation IT investments on business success. While those studies concentrate on the relation of business strategy and IT strategy and, thus, are representatives for the strategic level of alignment, some other studies concentrate on operational alignment perspectives between organizational processes and IS processes (e.g., Cragg et al., 2007, Bergeron F. et al., 2004). In sum, operational integration found less consideration in IT alignment research.

As inter-organizational dependencies bring relational aspects such as trust, aggravated communication, and negotiation rationality into the foreground, some recent studies shifted the perspective in IT alignment research. Rai et al. (2006)” study supply chain integration and show a general effect on firm performance. A similar observation can be made in the publication of Saraf et al. (2007), and their study on interfirm IT integration and business performance. Although both publications deal with IT alignment issues of inter-organizational integration, they neglect a fit perspective since they consider a direct effect rather than a contingent perspective on interactions of business and IT. Leaving this dyadic perspective of organizational collaboration, Zarvic et al. (2011) take a network-oriented stance and consider organizations and their relations as part of a network. They conceptualize layers and dependencies in inter-organizational relations, which need to be aligned with the IT function. It is argued that a change in one layer must lead to a change in all dependent other layers in order to account for the relationship. Consequently, a permanent fit of information systems and applications with all dependent layers is important. Although Zarvic et al. argue that the fit perspective is relevant; their framework focuses on sequential dynamics between business and IT rather than the measurement of functional integration of business and IT. Thus far, to the best of our knowledge, no study examines the fit of operational IT alignment in inter-organizational networks.

As we have seen, studies underline the importance of an alignment perspective which contributes to the understanding of the functioning of IT and organizational performance. Therefore, we will develop an instrument which measures the operational IT alignment of inter-organizational networks based on the framework of network management processes by Sydow and Duschek (2011).

3 RESEARCH DESIGN

This paper aims to contribute to the understanding of IT alignment in the context of inter-organizational networks. First, we are interested in the measurement of network IT alignment. We will therefore need to clarify both the degree of abstraction and the conceptualization of fit. Second, we want to know if differences in the mode of governance do have an effect on network IT alignment.
The conceptual model is depicted in Figure 2 and casted at two levels. When modelling alignment, degrees of abstraction can be differentiated (Chan et al., 1997). The system’s model rests on the premise that alignment between business and IT can be best described as a single overall factor. This approach aggregates all alignment scores at a low level into a single high level factor; further analyses take this factor as a starting point. Another approach involves a fit at a lower level. In this configuration, it is assumed that a fit can be meaningfully disaggregated. We call this the process-approach and distinguish four dimensions of network processes as suggested by Sydow and Duschek (2011). The consideration of distinct alignment scores may help to better understand effects of distinct process groups. However, earlier studies on alignment show generally better predictive power of the systems approach (Chan et al., 1997; Cragg et al., 2002; Hoffman et al., 1992).

Based on Henderson and Venkatraman’s (1993) strategic alignment model, the designated research concentrates on the “functional integration” of the organizational and IT side. When discussing the alignment between a process and the corresponding IT resources, an empirical study must specify how to conceptualize fit. Venkatraman (1989) argues in his paper on perspectives of fit that in the case of a high degree of specificity of a theoretical relationship along with a specific criterion anchoring, fit can best be measured using a moderation approach. Since we will use a framework of 22 processes and consider IT alignment in its relationship to performance as our unit of analysis, the evaluation approach “fit as moderation” seems appropriate for the intended purpose. The concept of “fit as moderation” models alignment as an interaction term of two variables (Venkatraman, 1989). By doing so, each variable represents one involved domain, whereas the multiplicative combination of both quantifies the alignment.

After discussing two degrees of abstraction and the conceptualization of network IT alignment, we are now interested in the role of governance modes. The degree of centralization revealed to be a fundamental characteristic in organizational decision making and IT governance research (Brown and Grant, 2005). A high degree of centralization facilitates organizations to profit from integration and standardization. However, a decentralized IT decision making allows reacting faster on changing conditions and reducing coordination costs. This can also be translated to the context of networks (Trang et al. 2013). Provan and Kenis (2008) distinguish governance modes in networks. According to their degree of centrality, networks with governance by a lead organization or networks with a central network administration organization have a centralized decision making structure. On the other hand, networks which follow a shared self-governance waive a dedicated and separate governance entity and their decision making can be classified as decentralized. In this study, we want to explore, if the choice of the governance mode influences the degree of IT alignment. Since IT related decision making in inter-organizational networks is a rather new field of study (Grant and Tan, 2013, Trang et al., 2013) and prior knowledge is limited, we will state non-directional hypotheses, i.e., we do not

Figure 2. Conceptual model for measuring IT alignment in regional networks: system-approach (left) versus process-approach (right). ITS: IT support; BP: business processes; ITA: IT alignment

The conceptual model is depicted in Figure 2 and casted at two levels. When modelling alignment, degrees of abstraction can be differentiated (Chan et al., 1997). The system’s model rests on the premise that alignment between business and IT can be best described as a single overall factor. This approach aggregates all alignment scores at a low level into a single high level factor; further analyses take this factor as a starting point. Another approach involves a fit at a lower level. In this configuration, it is assumed that a fit can be meaningfully disaggregated. We call this the process-approach and distinguish four dimensions of network processes as suggested by Sydow and Duschek (2011). The consideration of distinct alignment scores may help to better understand effects of distinct process groups. However, earlier studies on alignment show generally better predictive power of the systems approach (Chan et al., 1997; Cragg et al., 2002; Hoffman et al., 1992).
specify a positive or negative influence of the network governance mode in advance. The first hypothesis refers to the system approach, while the second group of hypothesis refers to the process approach:

*H1:* The degree of centrality of the network governance mode influences the degree of total network IT alignment.

*H2.1:* The degree of centrality of the network governance mode influences the degree of network IT alignment of the selection process group.

*H2.2:* The degree of centrality of the network governance mode influences the degree of network IT alignment of the regulation process group.

*H2.3:* The degree of centrality of the network governance mode influences the degree of network IT alignment of the allocation process group.

*H2.4:* The degree of centrality of the network governance mode influences the degree of network IT alignment of the evaluation process group.

## 4 METHODOLOGY

### 4.1 Operationalization and calculation of the variables

The operationalization of the research model covers three areas: measurement of network process importance, measurement of IT support, determination of the governance mode, and calculation of ITA. Out of descriptions by Sydow and Duschek (2011) we first derived a framework of 22 processes (see Table 1). The processes are grouped along the four areas selection, regulation, allocation, and evaluation. In order to measure the importance of each process, a question seeks the relevance on a scale ranging from 0 (not important) – 6 (very important). Building upon the network process framework, we derive measures for the corresponding IT support and ask to state the degree of support, also ranging from 0 – 6. Finally, in order to determine the mode of governance, we follow Provan and Kenis’ (2008) suggestions and distinguish between networks with a centralized authority (network administration organization or lead organization) and networks without a fixed authority (shared governance).

As mentioned earlier, we measure the fit by means of the moderation approach. We first multiply the values of the network process importance with the values of their corresponding IT support. For the process-approach, we then aggregate them into their belonging categories and receive alignment scores for ITA selection, ITA regulation, ITA allocation, and ITA evaluation. For the system-approach, we sum up all alignment scores of all processes into the final variable ITA total. Accordingly, a low score indicates a low alignment, vice versa; a high score indicates a high alignment.

### 4.2 Sample and non-response bias

For this study, an online survey method was chosen. The link to the survey was distributed among organizations in German 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. Randomly 2800 participants were selected and survey invitations were sent out targeting executive managers responsible for the network collaboration. Of the participants, 198 passed the filter questions that were asked to determine whether the participant works in a computer-supported network. That gives a return rate of 7.07%.
Table 2. Sample characteristics.

<table>
<thead>
<tr>
<th>Organisation size</th>
<th>Number (%)</th>
<th>Organization type</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro, up to 9 employees</td>
<td>60 (30.3)</td>
<td>Enterprise</td>
<td>153 (77.3)</td>
</tr>
<tr>
<td>Small, 10.49 employees</td>
<td>52 (26.3)</td>
<td>Research institution</td>
<td>10 (5.1)</td>
</tr>
<tr>
<td>Medium, 50.249 employees</td>
<td>32 (16.2)</td>
<td>Non-Profit organization</td>
<td>6 (3.0)</td>
</tr>
<tr>
<td>Large, at least 250 employees</td>
<td>39 (19.7)</td>
<td>Public / Gov. institution</td>
<td>11 (5.6)</td>
</tr>
<tr>
<td>Not specified</td>
<td>15 (7.6)</td>
<td>Not specified</td>
<td>18 (9.1)</td>
</tr>
</tbody>
</table>

The organizational attributes in the collected sample show high compliance to the intended target group of regional network members (Sydow, 2010). The observed sample composition confirms that around 70% of the study participants are small or medium-sized organizations. In addition, the interviewed members predominantly follow an enterprise-like business orientation (77.3%). Finally, the majority (59.6%) of the respondents consider their surrounding inter-organizational network as decentralized.

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. Therefore we use two common measures to account for that threat. First, the sample has similar characteristics with the basic population. This indicates that our sample is representative for the population. Second, we compare mean values of answers of the first third and the last third of the sample (Armstrong and Overton, 1977). A t-test revealed non-significant differences (at a significance level of p<.05). Both indicate that non-responses are not a major threat for this study.

4.3 Data analysis

Descriptive analyses are reported in Table 3. The first column shows the average importance of each process dimension respectively the average total importance. All mean process importance lay around the middle of the 7-point Likert scale. The standard deviation is between 1.185 and 1.586. Both are typical values in this area (Cragg et al., 2002), which indicates the validity of the measurement instrument.

When analysing the indicated importance of each process group, we see that the selection processes are considered to be most important independently from the mode of governance, i.e., 2.820 for the decentralized and 3.108 for the centralized networks. The allocation processes got the lowest scores with 2.311 and 2.796, respectively. Taking the IT support into account we can see three interesting patterns. First, the IT support shows lower scores than the stated process important. This holds for both decentralized and centralized governance modes. The best fit could be reached for the allocation function of centralized networks with a difference of .205, and the worst fit for the selection function of decentralized networks with .862. Secondly, the data for the IT support does not show a fit to the relative order of the process importance. While the selection process is rated as most important, the IT support is worse than for the regulation and allocation process. In general, the indicated IT support of the process groups lays closer together with a maximum range of .192 compared to the process importance with .588. Thirdly, the standard deviation of the IT support is higher than the process importance of all process groups. This indicates that there is slightly more variation in the IT support between the networks compared to the process importance.
When looking at the alignment scores, there is only little variation between the process groups. For decentralized networks, the alignment scores range between 6.367 and 6.731. Within the group of centralized networks, the evaluation processes reached the highest scores with 9.947, and the selection processes reached the lowest scores with 8.844.

Before selecting an appropriate method to check for group differences between centralized and decentralized governance modes, we ran an exploratory analysis. The test for non-normality shows high significant results for all dependent variables (Kolmogorow-Smirnov: p<.01, Shapiro-Wilk: p<.01). The Leven test for homoscedasticity, i.e., the homogeneity of the variance, shows insignificant results for all variables (p>.10). Since our data is non-normal distributed and indicates to be heteroscedastic, we use the non-parametric Mann-Whitney test for further analysis. The Mann-Whitney tests whether two independent distributions are from the same population without the assumption of normal distribution and homoscedasticity.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Z-score</th>
<th>P-value</th>
<th>Effect size</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: ITA system perspective and governance mode</td>
<td>-3.019</td>
<td>.003</td>
<td>.234</td>
<td>Yes</td>
</tr>
<tr>
<td>H2.1: ITA selection and governance mode</td>
<td>-2.014</td>
<td>.044</td>
<td>.161</td>
<td>Yes</td>
</tr>
<tr>
<td>H2.2: ITA regulation and governance mode</td>
<td>-2.669</td>
<td>.008</td>
<td>.214</td>
<td>Yes</td>
</tr>
<tr>
<td>H2.3: ITA allocation and governance mode</td>
<td>-2.440</td>
<td>.015</td>
<td>.200</td>
<td>Yes</td>
</tr>
<tr>
<td>H2.4: ITA evaluation and governance mode</td>
<td>-2.589</td>
<td>.010</td>
<td>.216</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 4. Results of the Mann-Whitney test for mean differences.

Since all hypotheses are not directional, we used a two-tailed test to compute significance levels (p-values). We regard p-values below the threshold of .05 as statistical significant. In order to report a measure of the size of the effect, we calculate approximate effect sizes by dividing the z-score with the square root of the total number of observations (Rosenthal, 1991). Effect sizes between .10 and .30 are regarded as small to medium, and between .30 and .50 as medium to large (Rosenthal, 1991).

The results show support for hypothesis H1 (p<.01), i.e., IT alignment from a system’s perspective significantly differs if a network has a centralized governance mode. We also find support for the process approach, i.e., H2.1 – H2.4. When aggregating the processes at the level of selection, regulation, allocation, and evaluation, the differences between the two groups become significant (p<.05). In both cases the effect sizes can be regarded as small to medium.
5 DISCUSSION

The paper laid out two questions in the context of IT alignment in regional networks. First, we asked how to conceptualize the concept of IT alignment. Second, we were interested in whether different governance modes of networks lead to different degrees in IT alignment.

In order to answer the first question, we developed a new quantitative instrument to measure IT alignment in networks. We derived a process framework from Sydow and Duschek (2011) and conceptualized alignment as the fit of their IT support, using the moderation approach proposed by Venkatraman (1989). We then suggested two different approaches of abstraction, a system and a process perspective. First, the results support the validity of the underlying framework. Second, when applying the new instrument we get significant values for both. One might argue that considering sub dimensions of ITA allows researchers to better distinguish effect sources; the aggregation into one single factor may lead to a loss of relevant information. Our data, however, shows that there is not that much variance among the different perspectives. Moreover, the system’s perspective reveals to have higher predictive power (p<.01) compared to the process perspective (p<.05). This is in line with research on intra-organizational IT alignment. They also find higher levels of aggregation to show better statistical characteristics, since alignment constructs at a lower level are not independent (Chan et al., 1997).

With this instrument we contribute to upcoming research allowing to measure network ITA. For instance, examining the role of ITA in the context of network collaboration success, or identifying antecedents of ITA, are possible areas of application. By explaining the functioning of IT in inter-organizational networks this helps for a better understanding of differences in network level outcomes. Furthermore, this tool also offers practitioners, such as network managers, the possibility to benchmark their ITA alignment against other networks. In a further step, they can also use it as a diagnostic tool in order to identify areas for improvement.

Our second question deals with the mode of network governance. We argued that networks with a centralized coordination differ in their IT alignment when comparing it with networks with decentralized coordination. The data supports this hypothesis for both the process and the systems approach. Networks with a centralized mode of governance have on average higher alignment scores. While the mean values for decentralized networks lay between 6.367 and 6.731, the scores for centralized governed networks are between 8.844 and 9.947. Also the total score of the system approach points in this direction. The Mann-Whitney test shows that there are indeed significant differences. 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 that are governed by a centralized network administrative organisation. 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 implementations of common IT become more likely. This argumentation finds also support in another aspect of the collected data. In general, networks with a centralized governance mode have a higher degree of IT support.

Ending with the result that the mode of governance can explain a substantial part of differences in the degree IT alignment in networks, contributes substantially to the understanding of IT alignment in the network context. When speaking about effectiveness of network governance modes, as it can be found in Provan and Kenis (2008), our results suggest that the centrality also influences IT and IT alignment. Moreover, 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.

The results and suggestions of this study must be interpreted with some caution. As mentioned earlier we decided to measure alignment following 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 argues on the basis of distances; hereby misalignment is defined 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, i.e., centralized networks still show significantly better alignment scores, the p-values however, get slightly worse. This is in line with earlier studies on intra-organisational IT alignment that could not show good empirical support for this concept of fit (Cragg et al., 2002, Hoffman et al., 1992). As it is typical in empirical studies which concentrate on a specific region, there is also a problem of generalizability. 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. Lastly, we already mentioned that the low response rate of this email based survey bears the risk of a bias in our sample due to self-selection. However, we implemented two measures which support the assumption that non-responses are not a threat to our analysis.

6 CONCLUSION

This paper contributes with the development and evaluation of an instrument to measure network IT alignment. Moreover, the new instrument found application in the question of network governance modes in their relation to alignment. Therefore, we first conceptualized IT network alignment and developed a measurement instrument, which covers network management processes and IT support. A survey was conducted with 198 network organizations in Germany. The data support the validity of the measurement instrument. The instrument allows two levels of abstraction, i.e., at a process group level and at a system level. We conclude that the system level approach is favourable due to its statistical characteristics. Finally, we did show that networks with a centralized mode of governance better reach alignment of network processes and IT than do networks with a decentralized mode.

Although the results show that a centralized governance mode can explain a substantial part of differences in the degree IT alignment in networks, the data also shows that there is still space for further explanations, for even within the two groups there is strong variation. We suggest that further research should, first, go deeper into the causal mechanisms behind the effect relationship of governance modes and, second, find further factors which contribute to the understanding of the functioning of inter-organizational networks and its relation to network level outcomes. Especially, the aspect of high degrees of IT alignment and network level outcomes on the one hand, and strategic flexibility on the other hand, provide avenues for further studies.

This paper is a first step towards quantitative studies in the field of contingent perspectives on alignment in the context of inter-organizational networks. Future studies can use this instrument in order to better explain variance in network IT alignment. Practitioners can also use the tool for diagnosing misalignment at the process level and to benchmark their overall performance at the systems level.
References


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