

RESPONSIVENESS AND AGILITY IN COLLABORATIVE NETWORKS

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Abstract

This paper investigates the responsiveness of technology and network governance in the case of collaborative networks comprising multiple organizations and identifies factors affecting the structure and the sustainability of collaborative network governance models. More specifically, the study focuses on the effect of network configurations that combine integration and unbundling on the collaborative network's agility. The inferences draw on the cross case analysis of four case studies, representing collaborative networks situated within different industry segments in one geopolitical location. Primary data were collected through semi-structured interviews with representatives from each collaborative network. The paper has identified effective communication among partners as an essential requirement for the success of any collaborative project. With regards to agility, a proposition may be advanced that for some type of collaborative services, a higher degree of vertical integration is a better approach compared to a higher degree of unbundling. However, the study findings also indicated that unbundling is a good approach in the case of collaborative services where a cloud based deployment and delivery approach is the priority, and the set of collaborators is diverse. Finally, the findings also showed that a participatory, and largely decentralized model of governance, is more effective in achieving responsiveness, in a collaborative network, than a centralized model.

Keywords

Agility, Responsiveness, Governance, Unbundling, Vertical Integration, Collaborative Networks

1. Introduction

Collaborative processes across a network of social and economic actors who interact through technology enable the formation of a collaborative network (CN) where participants co-create value by sharing and learning from each other's experiences with the different aspects of the service they collaborate to produce (Lusch, Vargo, & Tanniru, 2010). Technology governance is key to developing effective ICT management processes and is especially important for organizations engaging in multiple business collaborations. For example, participatory technology governance models explicitly recognize the roles of all internal and external supply

chain actors as stakeholders in technology acquisition and deployment (Andriole, 2015). Internal and external stakeholder interactions occur within the frameworks of their respective organization's business models, which provide the blueprint for creating and capturing value from services, products, and innovations (Kamoun, 2008). Among others, the organization's business model determines how technology characteristics and potential are converted into economic outputs (Sharma & Gutiérrez, 2010). Therefore, the CN participants' specific business models may have a significant impact on the CN governance model.

Increased product variety coupled with increased global market volatility has rendered responsiveness to customer requests as a key competitive advantage factor. Responsiveness can be viewed as a measure of an organization's flexibility in adapting to changes in customer demand (Holweg, 2005; Reichhart & Holweg, 2007). In volatile environments, responsiveness can be achieved by adopting an agile approach that aims to support the CN's long-term sustainability by enhancing the CN's configuration capability (Christopher, 2000; Loss & Crave, 2011). Unbundling and vertical integration provide two configuration examples. Unbundling refers to the functional division of the network where each member organization is involved with a distinct unit of work as part of the final product or service while vertical integration refers to a member organization owning a significant part of the supply chain related to delivering the final product or a service. An agile CN may respond to change by varying the degree of unbundling and vertical integration across the network.

Research in technology governance has focused so far on single organizations (Ali & Green, 2012). While certain inter organizational and collaborative aspects of technology governance have been considered in prior work (e.g., Chong & Tan, 2012; Hekkala, Urquhart, Newman, & Heiskanen, 2010) to date, little research has considered CN governance in the case of ICT-enabled CNs comprising multiple organizations. This study aims to address this gap and contribute to the understanding of how the members of an ICT-enabled CN act together in order to create successful CN governance model and achieve a common objective. The study focuses on responsiveness and agility as two key CN governance model characteristics. In particular, it investigates how CN governance structure may support achieving an optimal level of the CN governance model responsiveness, and analyses the effects of unbundling and vertical integration on the CN governance model's agility.

The study findings are based on the analysis of qualitative data collected through semi-structured interviews from four cases drawn from different industry segments. The research outcomes provide an insight into the factors influencing the development and the sustainability of feasible CN governance models. The study contributes to the body of knowledge in the areas of the impact of technology governance on the responsiveness and agility of the CN governance model. The rest of the article is organized as follows: the next section reviews relevant literature and formulates the research questions. The study's research approach and design (multiple case study), and the findings of the empirical investigation are presented in the third and fourth sections, respectively. The insights drawn from the findings and their implications are discussed in the fifth section. The last section highlights the study's contribution and limitations and provides directions for further research.

2. Literature review

2.1 Collaborative network governance

In CNs, collaboration is an intentional property derived from the shared belief that together, network members can achieve goals that would not be possible if attempted individually (Teo, Manaf, & Choong, 2013). A CN may comprise a number of independent entities, i.e., organizations) from the public as well as from the private sector who may differ significantly in terms of operating environment, culture, and objectives (Camarinha-Matos & Afsarmanesh, 2005; Loukis, Janssen, Dawes, & Zheng, 2016). To achieve their common goals, CN members rely on ICT tools and techniques such as computer and communication networks, knowledge portals, group decision support systems, and electronic meeting systems to support their networking functionality and collaborative relationships. Therefore, it becomes necessary to develop and deploy an appropriate governance model that enables critical information sharing and conflict resolution across the network of collaborators including their ICT infrastructure (Fink, 2007; Loukis et al., 2016; Tsui, Chi, & Holsapple, 2005).

Within an organization, a desirable behavior in the use of ICT is encouraged by the organization's ICT governance model which also provides a decision making and accountability framework (Weill, 2004). The framework facilitates strategic ICT and business alignment through accountability and performance management and ensures that maximum business value is accomplished through the development and maintenance of effective ICT controls (Webb, Pollard, & Ridley, 2006). Depending on the organizational context, ICT governance models may vary from highly centralized, to decentralized. In the former, decisions are made by a central group reporting to the company's corporate chief executive. In the latter, decision making rights are shared across the enterprise and its business units (Andriole, 2015).

CN governance may be seen as a form of decentralized governance framework known as participatory ICT governance. In participatory governance, decision-making rights can be distributed across multiple external and internal participants. A governing body established at the start of the collaboration may coordinate the collaborative communication process. It disseminates ICT governance policies and procedures to the collaborating partners (Andriole, 2015); collaborator relationship specific processes may also need to be designed and implemented (Heinrich, Zellner, & Leist, 2011). Expectations may be formalized by the use of appropriate contracts and agreements (Loukis et al., 2016). As trust among the partners may influence significantly the outcome of the collaborative activities it may be necessary to develop as well a trust management strategy (Klijn, Edelenbos, & Steijn, 2010).

2.2 Responsiveness and agility

An organization's responsiveness refers to its ability to adapt and innovate in response to information about market change, including changes in customer needs, and in the competitive environment (Wei, Samiee, & Lee, 2014). Similarly, a responsive CN can be defined as the one that is capable of generating revenue for its partners in a competitive environment by reacting quickly and cost effectively to changing market requirements. The responsive CN adjusts to the new market conditions by developing appropriate core skills and utilizing human and information resources as quickly as possible (Gunasekaran, Lai, & Cheng, 2008).

Responsiveness is a global characteristic of agility (Sherehiy, Karwowski, & Layer, 2007). An agile CN would be able to reconfigure its services or products in response to the new requirements and propagate the changes across the environments of the collaborating partners. Due to its inherent flexibility, an agile CN governance model may act as a defense mechanism in volatile market conditions, when demand is unpredictable (Bernardes & Hanna, 2009).

External pressures such as global competition, deregulation and advances in technology may drive organizations towards unbundling, where the company devolves itself of one or more of its key business activities and retains the ones that will make it more successful (Hagel & Singer, 1999). Unbundling normally occurs along the lines of customer relationship management, product innovation and infrastructure management. However, unbundling in a CN may be achieved by the delivery of products or services through the collaboration of different partners rather than by organization restructuring. By performing their specific roles as determined by the CN governance model, CN members contribute to each other's key activities and increase their efficiency. Furthermore, depending on the external requirements, an agile CN may also deploy a vertical integration strategy, where the different departments of a single partner (usually the major CN stakeholder) produce the majority of the different market specific services or products delivered by the CN in conjunction with contribution from the rest of the partners.

2.3 Research questions

Drawing on the analyses above, the research questions guiding the empirical investigation were formulated as follows:

RQ1. How to achieve responsiveness across a CN?

RQ2. How does the level of integration across the CN affect its agility?

3. Research approach and design

Considering the relative lack of specific theories and conceptualizations in the area of network governance of CN comprising multiple collaborators, the study adopted an exploratory approach. The study deployed a multiple case methodology that allowed to gather qualitative data from study participants and draw inferences from the analysis of their views (Corbin & Strauss, 2014). To enable gathering and analyzing data from different sources the study design deployed qualitative research methods (Yin, 2014).

3.1 Study sample and data collection

The case study sample included four New Zealand-based CNs, further referred to as TAP, HI, SIM, and BD (Table 1). Each CN was formed across different industry sectors and consisted of three or more partners who used ICT extensively in order to achieve the collaboration objective. Aiming to gain deeper insights from the study participants, primary data were collected through semi-structured face-to-face interviews. The interview guide included 13 questions, each one exploring a particular aspect of one of the research questions: CN responsiveness and how it is measured, CN governance models and challenges, factors influencing decisions about establishing a CN and determining its governance model, agility and agility measures, business models, vertical integration, and unbundling. As a rule, the interview guide was e-mailed ahead of the interview to the six participants who were recruited. Interviews were recorded and transcribed. Substantial additional information about each CN was retrieved from a number of

secondary sources, including printed and online material such as organizational websites, and business case reports. The Computer Assisted Qualitative Data Analysis (CAQDAS) tool NVivo was used to organize the large number of documents and assist in interpreting the data.

CN	Main Stakeholder	Main Stakeholder's Industry Sector	Other Collaborators	Participant' Organizations
TAP	TAP-A	Transport	TAP-B, TAP-C, TAP-D, TAP-E	TAP-D, TAP-E
HI	HI-A	Insurance	HI-B, HI-C, HI-D	HI-A
SIM	SIM-A	Telecommunications	SIM-B, SIM-C, SIM-D, SIM-E, SIM-F, SIM-G	SIM-B
BD	BD-A	Airline	BD-B, BD-C, BD-D	BD-A, BD-B

Table 1: Study sample

3.2 Data Analysis

Participant interview data were analyzed applying a cross case analysis approach (Stake, 2013). Three rounds of coding and interpretation were conducted. First, data were examined deductively in order to organize them in the five broad categories derived from the research questions (Responsiveness, Agility, Business Model, Overall Communications and Types of Bundling). Next, the data were coded inductively and iteratively as a means of achieving better understanding of the meanings represented in each category (Elo & Kyngäs, 2008). Related meanings were grouped together to define a data code. The 25 data codes that emerged across the five categories and the data associated with them were examined further in order to identify common themes across the codes. The themes that emerged (User Experience, Core Offerings, Critical Success Factors, Degree of Unbundling, and Critical Constraints) represented the key points made by the research participants.

4. The Four Cases

4.1 TAP: Paying for car parking

A local governing body (the main stakeholder, TAP-A) started the TXT-a-Park scheme in 2004 in collaboration with TAP-B, the then second largest mobile network operator (MNO). Later, the largest MNO (TAP-C) also became part of the scheme. The scheme provides a mobile payment service, namely a text messaging (SMS) based option for paying parking fees in the local governing body owned parking lots. The TAP service was seen by the main stakeholder as a secure and efficient cashless payment method that reduced the need to manage the cash stored at the car parking payment machine. The service became a success, mostly because it did not require customer pre-registration and therefore was convenient and accessible (Sharma & Gutiérrez, 2010).

The MNOs (TAP-B and TAP-C) are responsible for maintaining the mobile communication channel between the customer and the TAP service, for ensuring that the customer pays for their parking ticket, and for distributing the revenue. The two participating MNOs together represent about 75% of the mobile customer market which contributes towards the service's viability. The organization TAP-D is a leading mobile payment solutions provider and it enables the interface between the customer and the payment system. Finally, an established parking payment machine vendor (TAP-E) developed the integrated multi-modal payment TAP payment terminal that accepted SMS payment. The TAP process works as follows. The customer composes a request for a parking ticket and sends it as an SMS to a specific phone number. The request reaches

TAP-D, who obtains an approval from TAP-B/TAP-C based on data about the customer's financial status. The surcharge on top of the actual parking fee is distributed between the network collaborators (excluding TAP-A) as their revenue (Fig 1).

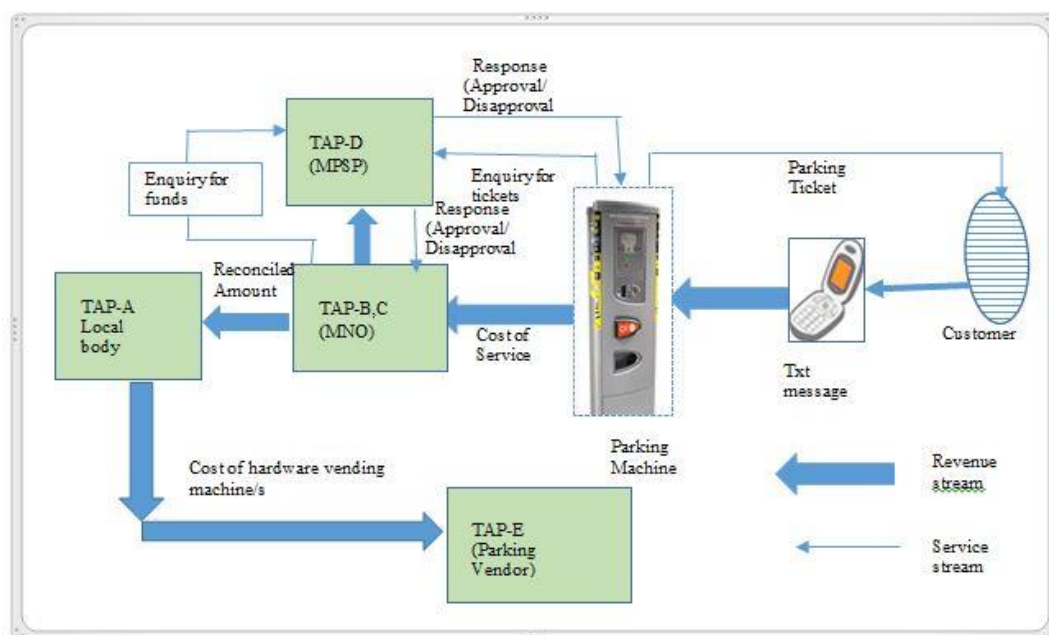


Figure 1: A schematic representation of TAP showing the service and revenue streams

4.2 HI: Health and travel insurance application and claim processing

The main stakeholder HI-A is a well-established regional health and travel insurance provider. It expanded significantly since its launch in 2013 and through a series of acquisitions became the country's second largest health and travel insurer. HI-A offers a wide range of insurance products (including private hospital and specialist care, general practitioner visits, and non-referral treatment). The organization uses advanced ICT tools such as a responsive website that supports customer interaction using mobile devices, and an online service portal that offers several digitized customer service options. HI-A collaborates with multiple partners, to achieve common objectives. To enable online insurance claim payback, HI-A works with a major bank (HI-B) which maintains a claim disbursement fund. Online premium payment is achieved through a collaboration with HI-B and also with HI-C (a payment gateway provider), To digitize incoming paper mail, including applications and claim forms, HI-A works with the organization HI-D which converts the paperwork into an appropriate electronic format and channels it to the relevant recipient within HI-A.

4.3 SIM: Automation of SIM card sale and rebate processing

The main stakeholder SIM-A offers a service that involves the sale of prepaid SIM cards and the subsequent rebate processing. The service was introduced in mid-2013. SIM-A is a telecommunication services company that has an established network of retailers to whom they lease point-of-sale terminals. SIM-A stock, resell and carry out the rebate processing of prepaid mobile SIM cards for all major MNOs and virtual MNOs (VMNOs). The partnering MNOs/VMNOs reduce their operational costs by selling SIM cards to the public using SIM-A's retailer

network as a distribution channel. Figure 2 shows the SIM card flow. SIM-A purchases SIM cards from partner MNOs/VMNOs (SIM-C, SIM-D, SIM-E, SIM-F, SIM-G) and stocks them in the physical warehouse of its major collaborator SIM-B (a local VMNO). SIM-A sells the SIM cards to participating retailers and activates them when acquired by customers. “Rebate” is a fixed discount applied to the SIM card cost paid by retailers to SIM-A, awarded to retailers after each post-activation SIM card top-up. According to the collaboration agreement, the partner MNOs/VMNOs notify SIM-A on a monthly basis about SIM cards topped up after activation, to enable SIM-A and SIM-B to determine and process the rebate due to retailers (Fig 2).

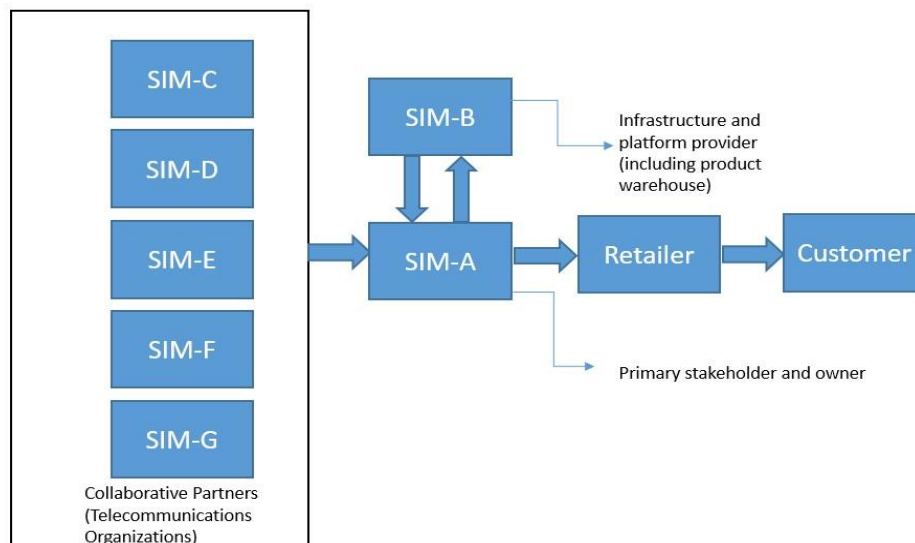


Figure 2: SIM card sale and rebate processing

4.4 BG: Self-service check-in and bag drop

The main stakeholder BD-A is one of the major country’s airlines, operating passenger flights to more than 50 destinations locally and worldwide. BD-A was privatized in the late eighties but later returned to majority government ownership. In order to speed up the customer check-in process BD-A and its collaborators developed and installed self-service check-in kiosks and bag drop points in all of the major airports in New Zealand they used. BD-A’s most significant collaborator was BD-B, a synergistic group of technology companies specializing in the design, fabrication, installation and commissioning of baggage handling and security screening systems with whom BD-A had already collaborated previously. The third collaborator BD-C participated as a project manager overseeing the work and ensuring minimum disruption of day-to-day operations. The last collaborator BD-D (a telecommunications operator) upgraded the airports’ local area networks to provide support for the new self-service. As the project aimed to complete five airport updates within just six weeks, its success depended significantly on the efficiency of the CN governance. The new service has helped reduce long passenger queues and operational costs, and reorganize the terminal space, enhancing passenger experience.

5. Discussion

5.1 CN governance model responsiveness

The study’s first research question was formulated as “How to achieve responsiveness across a CN”? It was found that although “achieving optimal responsiveness” was understood somewhat differently by participants, the data analysis indicated that across all cases, effective

communication was perceived as the most important requisite of achieving responsiveness. Indicative measurements of the level of CN governance model responsiveness were also identified (Table 2).

	TAP	HI	SIM	BD
Account management and escalation path in partners		✓		
Quality of experience	✓			
IT systems communicating to back end in real time	✓			
Quickness of response			✓	
Promptness in fault rectification	✓			
Outage SLAs	✓			
System up-time	✓			
Recorded and retrievable response to any issue			✓	
Speed of completion of the project				✓
Issue tracking and resolution				✓
Satisfactory adherence to SLAs	✓			✓

Table 2: Measuring CN responsiveness

The participatory character of CN governance appeared to support of responsiveness as even limited need-based decentralized governance on the part of the main stakeholder helped enhance responsiveness. To remain responsive, the CN governance model needed to incorporate strategies for the evaluation of customer needs and develop a robust revenue distribution structure.

Furthermore, the data analysis allowed to identify challenges the CN responsiveness including compliance issues, vendor management, transfer of knowledge, conflicting priorities around change management, lack of visibility and control, and unfamiliarity with the new service. Specific examples included long lead items, infrastructure and component lists, and short project execution times as illustrated by the following quote from the BD-A research participant:

“We set up fairly early to wake up what the long lead items were and then what the project plan would look like, besides what infrastructure would go there and then work out what components?”

Sound account management practices, as well as the competence of people working in a collaborative network are also critical aspects for maintaining CN responsiveness. The following quote from the HI-A representative’s interview support this:

“Certainly, their account management and understanding each other’s business is a big part for us. The competence of the organization, the people working within it.”

To be responsive to the market opportunities that may exist or arise, the ability and foresight to use pre-existing resources such as communication, sale and distributions channels, and hardware and software resources are of paramount importance. The quotes from SIM-B’s interview illustrate this.

“While doing feasibility studies, they found that they have potential market, they have potential customers, they have the resources as they have the joint venture with the customers as their retailers...They also thought if the communication media between all the partners was available and enough. So they checked that factor. They also made sure that they don’t have to increase the resources and all the available resources are sufficient for this project.”

Providing good customer experience and having the ability to scale and generate cost savings through the optimum use of labor and time were also identified found as factors helping the CN to achieve a reasonable level of responsiveness. The data suggested that creating the least possible interruption to the normal business operation was an indicator of responsiveness in the case of projects involving change, as expressed by the BD-B participant:

"I think one of the big things there is really ensuring business as usual is able to continue at each of the locations that we did installations. So that was one of the biggest considerations needed to be taken as they can't stop flying the aircrafts into the different airports."

5.2 CN governance model agility

The second research question was formulated as "How does the level of integration across the CN affect its agility?" The study data provided insights on how each specific CN's vertical integration/unbundling configuration contributed to maintaining the CN's agility. In each case, the data highlighted specific network configurations that remained agile in a fluctuating market, with the degree of unbundling vs. the degree of vertical integration closely linked to the case organization's business model.

An unbundled network configuration leading to a smooth running of a service stream in conjunction with a revenue stream, pointed to the CN being agile in the case of TAP. The ability of a CN partner who worked in unbundled mode (TAP-D) to quickly plug-in the application back end to the cloud mechanism was critical to the deployment and delivery of a sound and robust payment solution, and allowed the CN to remain agile. For example, if the main stakeholder TAP-A decided to start using a mobile phone app to pay for car parking, the desired transformation of the service would be performed efficiently and seamlessly.

The data suggested that in unbundled CNs, the possession of specialized skills identified a CN collaborator who may contribute significantly to the CN's agility. The views of the TAP-D representative illustrate the point:

"I think today there is a strong advantage in unbundled society in terms of technology. I think owning it in-house, the companies have realized that they are not experts in every field and it's cheaper and probably the economics is the driver to say it's cheaper to outsource to a skillset that's the expert rather than me hiring a skillset internally to run a full supply chain process."

A similar view was expressed by other participants according to whom it was essential for the delivery of the service or a product across their respective CNs, to distribute the work among collaborating organizations and ensure that each partner focused on their specifically assigned unit of work.

It became evident from the data that the adaptability to requirement changes was critical to the success of a CN service or project. However, the data also indicated that a certain level of vertical integration seemed to be a preferred approach towards achieving the strategic objectives of the main stakeholder (the case of HI). Vertical integration provided a central escalation point for ongoing projects, and allowed having more visibility and control. Both factors contributed to the CN's agility as suggested by the HI-A participant:

“When one owns an entity or part of that entity, an escalation path ...can be followed. There is a lot more understanding around priorities.Certainly the lack of visibility when you’re dealing with an external party ... it is a challenge especially when things aren’t going well.”

If efficient operational project management were a priority, then unbundling in the form of outsourcing a part of the work would be the natural approach towards achieving agility. However, the inherent delays caused by the need to obtain each collaborator’s agreement on critical governance issues, may become a significant disadvantage of unbundling; this quote from the SIM-B participant highlights the point:

“As your companies are owned by different management, so to make a decision, you’ll wait till everyone responds and agrees (to it). You alone are not allowed to go ahead with your decision.”

A higher level of vertical integration may be appropriate in cases where organizational knowledge needs to be retained within the organization. Visibility and control will be relatively easy to achieve as the capabilities of the personnel are well known to the management within the same organization. However, organizational functions that are not subject to such restrictions can benefit from outsourcing them to partners specializing in the respective areas (BD-A).

Finally, general services related to the use of ICT are normally unbundled and offered to partners through carefully documented SLAs (Service Level Agreements). However, according to participant BD-B, a larger degree of vertical integration may lead to better profit margins and financial gain in cases where the organization is skilled in several areas, as organizational skills help to achieve agility.

6. Conclusion

The study provides insights into how a CN attain responsiveness and agility and identifies factors that may contribute to achieving agility and responsiveness in a network of multiple collaborators, highlighting as well some of the industry-specific constraints in the path of creating a highly agile and responsive CN. The work contributes towards determining the desired characteristics of an agile and responsive CN governance model that may increase the collaborative partners’ ability to adapt to disruptions and fluctuations (Camarinha-Matos, 2014). The responsiveness and agility indicators identified above provide insights into how CN governance model responsiveness and agility may increase productivity performance, more specifically the efficiency of the interactions of the collaborative partners and the effectiveness of the intended outputs of the collaboration (Emerson & Nabatchi, 2015). Overall, the paper has identified effective communication among partners as an essential requirement for the success of any CN project and this is supported by recent studies; for instance, as a strategic capability, effective communication among partners enables the resilience of the CN governance model (Battistella, de Toni, se Zan, & Pessot, 2017).

The research has validated a commonly held notion that skills and expertise in a specialized area is an important ingredient for success in a network. Drawing on the study’s findings regarding agility, a proposition may be advanced that for some type of collaborative services, a higher degree of vertical integration is a better approach compared to a higher degree of unbundling.

The study findings indicate that unbundling is a good approach in the case of collaborative services where a cloud based deployment and delivery approach is the priority, and the set of collaborators is diverse. Further research is needed in order to identify the types of ICT-enabled services that may benefit from a vertical integration as the preferred structure of the CN. It may also be suggested that a CN may benefit from defining and monitoring a quantitative measure of the CN's responsiveness. Further research may identify appropriate responsiveness metrics and how measuring responsiveness may be used to improve CN governance. Finally, the study findings indicate that while a higher level of integration may have both a positive and negative impact on achieving and maintaining CN agility, a participatory, and largely decentralized model of governance, is more effective in achieving an optimal level of responsiveness in a CN than a centralized model. Further research involving a larger set of case studies operating in different contexts may provide new insights into the benefits of a decentralized model for specific collaborative products or services.

The following are some of the limitations of the study: first, not all key collaborators could be interviewed. This limited research participants' input and may have affected the scope of the inferences made, as some crucial collaborators' perspectives may have remained unknown. A similar limitation was the relative lack of publicly available data about some of the collaborating organizations. Finally, the research data were gathered from one geopolitical location. Future research in the directions outlined above may help overcome these limitations.

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