

## **The multifaceted role of the network orchestrator - a longitudinal study**

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# Title page

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The multifaceted role of the network orchestrator

– a longitudinal case study

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## Abstract

This longitudinal empirical case study develops a new framework for the role of the orchestrator of networks of Small and Medium sized Enterprises (SMEs). The SME network under study is followed during six years, through five stages of its lifecycle, and demonstrates the complex and multifaceted nature of the role of the network orchestrator. Various roles are needed for the various stages in order to achieve network retention and sustainability. This multifaceted role is found to encompass the roles as knowledge broker, innovation broker, network entrepreneur, and leader and strategist, where the latter role of leader and strategist emerges as the most salient. The similarities with the role of a firm manager seem paradoxical

in light of the dominating view of network management, as characterized by distributed and collective leadership.

Key words: Network orchestrator, network broker, innovation broker, network entrepreneur, network leader, SME networks

# The multifaceted role of the network orchestrator

– a longitudinal case study

## **Introduction**

Learning and knowledge creation are acknowledged as crucial prerequisites for innovation, entrepreneurship and competitive advantage. Access to external knowledge and interaction between companies in the form of open innovation is therefore increasingly important (West & Bogers, 2014). For small and medium-sized enterprises (SMEs) with scarce resources, network cooperation is one way to obtain such external knowledge as well as a tool to increase interaction, learning and knowledge creation (Pyke & Sengenberger, 1992). However, networks represent a special kind of fragile organization with loose couplings (Orton & Weick, 1990), and leadership of networks is perceived as having weak formal power. Nevertheless, SME networks are dependent on intermediaries to continuously motivate and support the participants in the network to interact, share knowledge and collaborate, in addition to cultivating and mobilizing the network in order to unleash the innovation potential and prevent the network from disintegrating.

There is a vast and rapidly growing literature on the use of networks as policy instruments to enhance innovation and to explain how regional co-operation and innovative networks work (e.g. Freeman, 1991; Hoang & Antoncic, 2003; Sydow, Schüssler, & Müller-Seitz, 2016). Broad discussions on how to orchestrate appropriate forms of co-operation are, however, relatively rare. There is a lack of research on network leadership (Pittaway, Robertson, Munir, Denyer, & Neely, 2004), as well as a lack of understanding of how intermediaries operate within SME networks (Klerkx, 2008). Therefore, ‘further research into the multifaceted orchestration process in innovation networks of SMEs remains essential if we want to fully

understand how innovation networks function and why innovation networks succeed or fail' (Batterink, Wubben, Klerkx, & Omta, 2010:71). Several scholars (Heidenreich, Landsperger, & Spieth, 2014; Hoang & Antoncic, 2003; Landsperger & Spieth, 2011; Müller-Seitz, 2012) call for longitudinal, qualitative, process- and outcome-oriented research on networks. Moreover, Freeman (1991:511) claims that 'longitudinal case studies on the evolution of networks could be particularly valuable'. The evolution of a network may be divided into phases, as exemplified for instance by Menzel and Fornahl's (2009) model of cluster lifecycles: emergence, growth, sustainment and decline.

The main aim of this paper is therefore to better conceptualize how the *role* of the network intermediary, denoted here as network orchestrator, changes across the evolution of the network lifecycles. Role is here defined as a set of actions and responsibilities (Mintzberg, 1973). In order to meet this aim, a theory review is presented and a longitudinal, process-oriented case study of a SMB network is conducted, with the paramount objective of entering a new market with new products. The case, a network of small and medium-sized technological firms called Healthinnovation, is followed from 2006 to 2012.

Healthinnovation, which is the real name of the network, from now on will be simply called "the network". The literature review and the longitudinal case-story, with a dramatic transition process and impressive results, is used to develop a new framework for understanding the changing role of the network orchestrator in SME networks. The research question is: *What are the roles of the orchestrator during the lifecycles of innovative SME networks?*

The paper continues with a literature review, followed by an account of the method used, case description and findings. Finally, before offering concluding remarks and addressing the study's limitations, the findings are discussed and the framework is developed.

## **Theory**

### ***Network governance and network orchestration***

*Network governance* mechanisms may be divided in three main models: shared governance, lead organization governance and Network Administration Organization (NAO) governance (Provan & Kenis, 2008; Sydow et al., 2016). Combinations of these governance mechanisms are also common (Provan, Fish, & Sydow, 2007). In shared governance networks, membership organizations make strategic and operative decisions, and coordinate all activities collectively. In lead organization governance networks, the intermediary is often equated with a hub firm (Dhanaraj & Parkhe, 2006; Dyer & Nobeoka, 2000; Müller-Seitz, 2012). In NAO governed networks, a third-party intermediary not involved in the network organization's core business takes this lead role (Provan et al., 2007), and in some cases contributes informally to pull a network through critical phases (Howell, Shea, & Higgins, 2005). These third parties come from various sources (Gould & Fernandez, 1989; Andrew Hargadon & Sutton, 1997; Howells, 2006): from academia (Lissoni, 2010), consultancies (Hargadon, 1998) and public funding agencies (Cooke & Wills, 1999; Ruckdäschel, 2014). The idea of third-party "intermediaries whose commercial goal is to bring heterogeneous parties together and co-develop innovations, not just to exploit the knowledge" is quite new, also to the network literature (Kirkels & Duysters, 2010:375). SME networks often lack a hub firm as a resourceful member; similarly to many other networks, the case network is governed by a third party from a public funding agency and supported by an elected board of representatives

from the network members. The governance mechanism is therefore mainly third-party NAO, combined with shared governance.

The intermediary is labeled and described in various shapes in the literature (for a review, see Popp, MacKean, Casebeer, Milward, & Lindstrom, 2013). Several authors (Dhanaraj & Parkhe, 2006; Gausdal & Nilsen, 2011; Heck & Vervest, 2007; Hällgren & Söderholm, 2010; Klerkx & Aarts, 2013; Paquin & Howard-Grenville, 2013) term this role as a ‘network orchestrator’, while Batterink et al. (2010), in a review of the different shapes this role may take, use the term ‘innovation broker’. Landsperger, Spieth, and Heidenreich (2012) use the term ‘network manager’, Heidenreich et al. (2014) ‘network conductor’, while Wenger et al. (2002) denominate the role as a ‘community coordinator’. Finally, Burt (2000) uses ‘network entrepreneur’, but limits the role to the building of the network infrastructure. This paper covers the multifaceted and complex intermediary role in various phases, which entails more than building the infrastructure, brokering or coordinating. The intermediary is therefore labeled *network orchestrator*.

Network orchestration is defined as ‘the set of deliberate, purposeful actions to create and extract value from the network’(Gausdal & Nilsen, 2011). It is, moreover, an interdisciplinary phenomenon involving theoretical fields like strategic management, knowledge management, networks and communities of practice as well as project management.

### ***Network lifecycle***

The network under study bears resemblance to a cluster, since it shares a common region and the businesses are largely complementary in how they serve their market. Furthermore, it is a network in progress, where the temporal dimension plays a role (Currie, Grubnic, & Hodges,

2011). As a tool for categorizing the phases in the lifecycle, we turn to Menzel and Fornahl's (Menzel & Fornahl, 2009) model of cluster life-cycles emergence, growth, sustainment and decline. Since the network under study is a constructed and publicly funded network, the emergence of the network is easier to date than it would be for networks or clusters that emerge "naturally".

### ***Orchestration activities and roles***

The expected behavior, or role, of the orchestrator is connected to various crucial network activities and processes. These activities and processes are used in the following to build a framework of the roles needed to perform them.

*Managing knowledge mobility* is at the core of an innovative network, since knowledge is the key resource, while knowledge sharing and knowledge creation are the key processes (Dhanaraj & Parkhe, 2006; Gausdal & Nilsen, 2011). In a network, knowledge is both geographically dispersed and either overlapping or complementary between the members. Knowledge is inherently sticky (Szulanski, 1996), which means that knowledge will stay within organizational boundaries unless mobility of knowledge is managed. Managing knowledge mobility involves sharing, acquiring and deploying knowledge, and includes facilitating common meeting places for learning. Moreover, it covers obstacles like tacit knowledge, epistemic barriers, lack of trust (Brown & Duguid, 2001), diverging vocabulary and so on. Managing knowledge mobility in an inter-organizational setting is often categorized as *knowledge brokering* " , which involves participation rather than mediation" (Brown & Duguid, 1998:103), and considered to "facilitate transactions between other actors lacking access to or trust in one another" (Gould & Fernandez, 1989:91) .



In order to broker knowledge, it is advantageous for the orchestrator to hold knowledge that overlaps the knowledge of other actors in the network, which is coined as a *knowledge activist* (von Krogh, Ichijo, & Nonaka, 2000). Such activists are important for cross-leveling knowledge, for learning and knowledge creation, and for establishing the right enabling context that allows tacit knowledge to be unleashed. Brokering also involves *boundary spanning*, which is “activities that occur at organizational boundaries, including internal boundaries that separate organizational subunits” (Pawłowski & Robey, 2004:646). Boundary spanning involves both *translating* in order to bridge perspectives and reduce cognitive distance, and framing “the interests of one community in terms of another community’s perspective” (Brown & Duguid, 1998:36). Translation is likely to be a challenge in a network of independent enterprises; additionally, the lack of a common knowledge and terminology constitute barriers for the network’s survival – as well as for its innovativeness and success (Clegg, Kornberger, & Rhodes, 2004).

Even when knowledge mobility is managed, networks frequently face the challenge of capturing the profits generated by innovation (Dhanaraj & Parkhe, 2006), where the ability to recognize innovative ideas and commercialize these are prerequisites. This is taking knowledge brokering one step further, to *innovation brokering*. Managing innovation appropriability - which consists of recognizing and developing innovative ideas, securing patents and copyrights, and governing the ability to capture the profits generated by innovation - is a crucial process within innovation brokering (Dhanaraj & Parkhe, 2006; Gausdal & Nilsen, 2011). Batterink et al. (2010) assert that innovation brokering encompasses demand articulation, network composition and innovation process management. Moreover, they argue that successful innovation brokering should focus on the needs of the SMEs, maintain a large and heterogeneous network, link complementary actors, set up coordination

mechanisms, handle conflicts between the network participants, focus on enhancing transparency in the innovation network and concentrate on facilitating interaction between the network participants. We argue, however, that network composition, in order to maintain a large and heterogeneous network and to set up coordination mechanisms, is more related to building the network infrastructure.

SME networks are often ‘loosely coupled’ (Orton & Weick, 1990) and fragile, which may cause instability. The *network entrepreneur* (Burt, 2000) builds the network infrastructure of division and coordination that increases network stability, hinders unstable linkages among network participants and contributes to collaboration between the firms. In managing network stability, the entrepreneur also organizes the entry and exit of the right members, enhancing the networks’ reputation and building the network coordination practice, e.g. meetings and teams (Dhanaraj & Parkhe, 2006; Gausdal & Nilsen, 2011). Network entrepreneurs should also be involved, develop something new in the process and be an inseparable part of the process itself (Kirkels & Duysters, 2010).

Along with several recent contributions (Ruckdäschel, 2014; Soekijad, van den Hooff, Agterberg, & Huysman, 2011), and recent reviews of leadership in the network context (Currie et al., 2011; Hogg, Van Knippenberg, & Rast, 2012; Müller-Seitz, 2012; Sydow, Lerch, Huxham, & Hibbert, 2011; Sydow et al., 2016), we assert that there is reason to underscore the dimension of *leadership* activities in innovative networks of SMEs. Müller-Seitz (2012:430) defines leadership in interorganizational networks as “the direction of the activities of a network of independent organizations by one or more organization(s), either temporarily or permanently, in which this role is commonly perceived and accepted by the other participants”. He underscores that leadership in networks differs significantly from

leadership in individual organizations, but touches less on the activities inherent in this role. Imposing a common vision and developing a written constitution are leadership activities in the early phase of partnership (Currie et al., 2011), and action and leadership tend to be attributed to persons, rather than organizations (Sydow et al., 2011). Effective network leaders ‘should possess and extend social capital, build coalitions and act as mentors and brokers’ (Soekijad et al., 2011:1023). Another important leadership process is managing network health, which means nourishing the networks health condition, evaluating its contribution to its members, and constructing and effecting a strategy for the recovery of failing networks (Gausdal & Nilsen, 2011).

Leadership is commonly described as ‘making things happen through the actions of others’. In a network of SMEs, however, a number of factors complicate this role. Here we identify mainly three of them: 1) The network orchestrator has weak formal power. Generally, a network orchestrator combines the authority based on expertise and that based on position. Authority based on expertise presupposes a high degree of specific knowledge of the network’s practices (Huysman, 2004), while authority based on position presupposes formal status (Balkundi & Kilduff, 2005). Strictly speaking, neither of these categories of authority is readily accessible for a network orchestrator. For a third party NAO orchestrator, authority based on expertise is no matter of course in a network of SMEs, and neither is the formal position of an orchestrator given. On the contrary – it is often non-existent. 2) Networks represent a special kind of organization with loose couplings (Orton & Weick, 1990), and are normally fragile constructions, where the members can withdraw at any time. 3) The members’ bonds to their own organizations are generally stronger than those to the network. Carving out a strategy, as for example outlined by Barney and Hesterly (2012), is an important activity for the network orchestrator. For a network of SMEs, this is complicated by

the fact that this strategy must be aligned with, and also “compete” with, the strategies of the single enterprise.

The expected behavior, or role, of the orchestrator is connected to different important network orchestration activities and processes like knowledge brokering, knowledge activation, boundary spanning, translating, identity building, innovation brokering, bridge building and network leadership. The main content of the activities and processes, which are to a certain extent overlapping, is used to build a framework of the main roles needed to perform them. The identified, also somewhat overlapping, main roles of the network orchestrator are: *knowledge broker, innovation broker, network entrepreneur and network leader*. In identifying the roles, those of knowledge broker, innovation broker and network entrepreneur are clearly expressed in the network literature. Based on the review of recent literature, we argue that these roles lack the crucial and complicated network leadership activities, and claim therefore that the role of the network leader should be more emphasized. The framework of network orchestration roles and their respective activities is presented in table 1.

Table 1: The Roles, activities and processes of the network orchestrator

<b>Networks orchestrator roles</b>	<b>Activities and processes</b>	<b>References</b>
Knowledge broker	Managing knowledge mobility	Dhanaraj & Parkhe, 2006
	Knowledge activation	Gausdal & Nilsen, 2011
	Boundary spanning	von Krogh et al., 2000
	Translation	Pawlowski & Robey, 2004
Innovation broker	Facilitate transactions	Brown & Duguid, 1998
	Manage innovation appropriability	Clegg et al., 2004
	Articulate demands	Gould & Fernandez, 1989
	Innovation process management	Dhanaraj & Parkhe, 2006
	Link complementary actors	Gould & Fernandez, 1989
	Handle conflicts between the network participants	Gausdal & Nilsen, 2011
	Focus on enhancing transparency	Batterink et al., 2010
	Facilitating interaction between the participants	
Network entrepreneur	Building the network infrastructure	Burt, 2000
	Manage network stability	Kirkels and Duysters, 2010
	Compose the network	Gausdal & Nilsen, 2011
	Maintain a large and heterogeneous network	Batterink et al., 2010
	Set up coordination mechanisms	
Network leader	Empowering network members	Ruckdäschel, 2014
	Possess and extend social capital	Soekijad et al., 2011
	Strategy development	Sydow et al., 2011
	Managing network health	Gausdal & Nilsen, 2011
	Impose a common vision	Currie et al., 2011
	Develop a written constitution	
	Construct an intergroup relational identity	Hogg et al., 2012
	Strategic management	Barney and Hesterly, 2012

## Methods

This study aims to develop a new framework through a theory building approach (Eisenhardt, 1989). Case study methodology is selected because, according to Yin (2014) and Eisenhardt (1989), this is an appropriate research strategy for theory generation. It also affords the possibility to explore and richly describe the existence of a phenomenon in a single case (Siggelkow, 2007). Since longitudinal process-oriented research on networks is in demand (Heidenreich et al., 2014; Hoang & Antoncic, 2003; Sydow et al., 2011), it is our conviction

that this longitudinal, predominantly qualitative and inductive process-oriented case study will meet this call.

The selected case, Healthinnovation, is a triple helix network (Etzkowitz & Leydesdorff, 1997) of innovative SMEs, municipalities and an academic institution. It started out as an experiment in 2006, with the goal of connecting the research community and the regional industry. The Healthinnovation network was chosen as a case because it may work well as a critical case (Yin, 2014), due to its dramatic history and enormous challenges for the network orchestrator. The network was studied for six years, from 2006 to 2012. Data was collected through interviews, participative observation, a survey, and secondary sources in the form of document studies. Data was collected using a narrative approach during the interviews.

Narrative interviews (Czarniawska, 1998) are chronological relations of events that occurred during a specified period of time. The longitudinal data were obtained through the close monitoring of the development processes of the network, by means of participative observation. About 135 hours were spent on observation and participation. The researchers participated in meetings, seminars, 'innovation lunches', foresight workshops and product development workshops, both as regular participants and researchers. The documents studied were the initial plan of establishing this network, three comprehensive applications for funding, minutes, strategy reports, annual reports and the website. Ten in-depth interviews, five semi-structured interviews with key informants, and five informal, open interviews with the orchestrator were performed. The key informants were two CEO's, the orchestrator (interviewed twice) and one university Dean. All the semi-structured interviews were performed using an interview guide and they were transcribed verbatim. The survey was carried out as an on-line questionnaire to all 12 members of the network: 10 firms, one hospital and one university. Eight of twelve possible answers were received. The

questionnaire included both qualitative and quantitative questions. Data collection was carried out by informed consent, and all transcribed interviews were approved by the informants. In reporting the results, informants and firms were made anonymous.

Data have been analyzed using an interpretive and explorative approach to the field notes, the transcribed interviews and the documents, as well as by deploying existing theoretical frameworks as analytical dimensions. Threats to validity have been countered through researcher and data triangulation, combining data from interviews, survey, field notes and the studied documents, as well as looking for consistent findings, and continuous contact with the orchestrator.

### **The case**

Healthinnovation is categorized as a network, but displays also features of an emerging cluster (Menzel & Fornahl, 2009), since it consists of defined companies and institutions that are geographically concentrated and interconnected and largely complementary in how they serve their market (Porter, 1998). The members of the network are concentrated around the town of Drammen, which is the commercial and administrative center in a rural region in Norway. The industrial members of the network are predominantly technical SMEs. Research institutions are scarce in the area and mainly represented by the regional university; thus, building the network was part of a regional innovation policy.

The story of Healthinnovation is also a story of a struggle for network retention (Landsperger & Spieth, 2011). The need for different orchestrating roles may vary according to the different lifecycle phases. Healthinnovation started with the emergence phase, moved to a decline phase, followed by new emergence phase, a growth phase, and finally one of sustainment.

### ***The emergence phase 2006-2008***

The idea of the network was born in academia, and covers several academic fields, including health care and optometry; the goal was to develop the basis for a new research area and a new industry within “Health and Lighting”. Traditionally there had been several large companies in the lighting industry in the region, for instance Osram, which produced light bulbs in Drammen from 1916. One idea was utilizing the positive effect of correctly adjusted light in various contexts, e.g. in nursing homes or in work environments in general. In 2007 the project was granted funding from two national programs: the Arena program (funding from Innovation Norway) and the VRI program (funding from the National Research Council and the county authorities). In 2008 a full-time NAO network orchestrator, employed by the regional public innovation agency, was engaged. The orchestrator started by mapping out potential network members and visited firms within the domain of lighting that might be interested in joining the network, both inside and outside the region.

### ***The decline phase 2008***

Despite the efforts of the orchestrator, few relevant firms showed any interest in joining the network. Although they appeared to be regionally anchored, the most prominent firms did not have their headquarters in the region, and hence not their R&D departments. The regional offices were not authorized to commit to participation in the network, even if they had initially expressed an interest. The orchestrator endeavored to mobilize the regional hospital and the municipality. While the hospital cancelled most of the meetings and demonstrated very little interest, the municipality showed more enthusiasm. On the other hand, the regional university’s eagerness seemed to have decreased in the two departments involved. The decrease in the interest in the network was due to a combination of slow progress and low



interest on the part of the industrial actors, as well as to the alienation on the department of healthcare towards university-industry relations.

In 2008 the network was in a state of crisis. It appeared not to be deeply enough rooted in the regional industry nor in the public health sector. The network idea was born and nourished in the university, but its initial enthusiasm and participation had considerably cooled down. On top of this, the public funding from the Arena program was threatened by withdrawal. All in all, the orchestrator considered the SME network's contribution to its participants as close to zero, and close to failure. As the orchestrator explained later, "*I had to tell the participants that the baby is ugly – and not entitled to life*". The project in its form as a Health and Lighting network was therefore in a phase of decline.

### ***The new emergence phase 2008-2010***

Yet, through changing the content-focus and mobilizing new actors, the orchestrator tried to bring the network forward by a new emergence phase that started in late 2008. She used traditional strategic planning à la Porter (Porter, 1985) and looked to positioning the network in an industry that would grow in the future. First, the board was re-organized. The chairman of the board, a representative from a lighting solutions retailer, was replaced by a manager from an innovative technological firm. The new board was then invited to change the original focus from Health and Lighting to a broader focus on health and technology. The board consented and decided to change the name of the network from Health and Lighting to Healthinnovation. Next, the orchestrator took the initiative of mapping the relevant industries that could embrace the three parties of a triple helix – private firms, public sector and the university. She used the logic of core-competence (Hamel & Prahalad, 1994) by considering established technology produced for hard core markets like offshore, car industry and

maritime industry as fit for a new market – the rapidly growing public healthcare market for technological remedies.

The orchestrator drew a map of relevant regional technological firms, and decided to visit them in person. During 2-3 months she visited and interviewed 40 firm managers. An interview guide was developed, where the most important questions were: “Are you interested in innovation?”, “Are you interested in R&D?”, “Are you interested in cooperating with regional knowledge institutions?” She further challenged the firms on their market situation and asked them to reflect upon whether their core technology could be relevant for the healthcare market. In the Norwegian healthcare market, the public sector is the main customer, which makes it a complicated market to enter for SMEs alone. This is reflected in the words of one firm representative: *“It is of great value to be a part of a network and to have its credibility. Since you have no history to refer to, you are not able to enter the competition by yourself.”* The orchestrator succeeded in motivating 12 firms to cooperate in the refocused Healthinnovation. Their core competence was largely on ICT and technology. Very few of the firms had any experience in cooperating with researchers, and all but one had no previous experience within the health market. The 12 firms were complementary in technology and competence. As one of the industry representatives told us later, this complementarity of competence is part of the success; if it had been lower, *“Then it had resulted in much more overlapping competence, which would have created more fear of being fooled and an unhealthy competition.”*

In order to recruit public sector as part of the refocused network, the orchestrator established contact with Drammen municipality. One informant describes the orchestrator’s effort to recruit the municipality in this way: *“She has been struggling and knocking on the doors of*

*the chief municipal executive and the different services, and she has participated in meetings East and West*". Finally, she contacted the health department at the regional university, met the Dean and invited them to the refocused network. During this new emergence phase, the orchestrator succeeded in mobilizing new firms and remobilizing the public sector and the university.

Still, at this point the participants had only a vague notion of what they had in common, and what issues and projects they were to cooperate on. In order to interconnect the participants and develop a common and deeply rooted vision and strategy, the orchestrator organized five workshops in the period June 2009 to May 2010. The goals were to define mutual unique knowledge and mutual opportunities, strengthen the sense of connectedness and finally develop joint projects. The orchestrator put a lot of effort into motivating the actors for participation in the workshops, as is reflected in one of the participants' comment: "*The orchestrator hassled me into participating today, and I am so glad that I am here*". This resulted in workshop participation for 12 firms, the university, the regional hospital and the municipality. The workshops were organized as a foresight process, with team-work as the main ingredient. The three triple helix parts were mostly mixed in the teams, which were reorganized by the orchestrator prior to each workshop, so that each time different participants met each other and worked together. Each workshop lasted for two days, entailed an overnight stay at a retreat, and had about 22 participants.

It was a challenge to get the various actors to pull in the same direction. The different logics within respectively academia, public sector and industry surfaced clearly, something that seems to be a dilemma inherent in university-industry relations. As one of the firm representatives told us about the first workshop:

*It was very frustrating to be together with the municipality, ergo representatives from a demanding customer. Moreover, suddenly someone from the university was sitting there. What on earth? What are we actually a part of?*

The participants, the network orchestrator and the foresight workshop facilitator all emphasized the importance of the informal social interaction to build relations, such as dining and wining together in the evening. The workshops were facilitated by an external consultant, although he was merely “*regarded as a tool to initiate the process*”. The orchestrator influenced the program, participated actively and acted as a visible leader with clear viewpoints. As one participant told us two years later, the orchestrator “*represented the fellowship. I perceived her as the owner of the network, and it is still perceived in this way*”. Moreover, she played an important role in connecting the different actors and aligning their different requirements, as the following quotes from some firm representatives demonstrate:

*We are not really on the same planet as academia. I do not always understand what they want, it is completely different.*

*The cultural gap is huge, but she has experience in both environments, and functions as a bridge-builder. I think she tries to adjust and search for solutions that the firms can develop with support from academia. She has a very good understanding of networking and understands the connections between the university, the municipalities and the hospitals.*

The participating organizations came to realize that their core competence and areas of expertise were complementary and apt to jointly develop concepts, products and

organizational models aimed at forming a competitive edge into the healthcare market. During the subsequent workshops, interest in, and acknowledgement of, interaction and cooperation as important factors for achieving success within the health care technology market increased among the actors. In this phase, the orchestrator was also persistent in her approach to the university, insisting not only that they cooperate and participate in research, but also that the industry must be the premise provider for this research. With very small steps and a lot of patience, the orchestrator gradually succeeded in establishing interaction with the health care department on research and development issues. It was at this time that the foundation for operational collaboration and growth in the network was laid.

### ***The growth phase 2010- 2012***

The network made a practical turn as it started interacting with Drammen municipality, as the municipality initiated a project parallel to the development of the Healthinnovation network: the building of 16 senior citizen housing units with advanced technology, “Senior citizen housing for the future”. This proved to be an idea that all the network participants found very exciting. It was already a fully developed plan, which meant that there would be some funding available, and it seemed realistic and feasible. A lot of effort was made by the network orchestrator and the firms to achieve funding for parts of the development work. They succeeded, and the project was classified and funded as a ‘Private Public Partnership’ (PPP) project in October 2010. The orchestrator took the leading role and impressed the firms tremendously in the fundraising process and in the following completion of the contract between the network members. As one CEO told us one year later (in September 2011):

*It was then ‘Mother network’ merely took a seat in front of the door and stated that we are not leaving here before this has been finalized. It was a Friday afternoon, and she*

*expressed it to the lawyer in Innovation Norway. And if she had not done that, then we would probably not have reached the goal yet.*

Although Norway has several sources of funding for networks and SMEs, according to the firm representatives *“Leading-edge competence and a kind of broker role are needed to span and apply for such funding”*. The orchestrator fills precisely this role. As one of the suppliers states, *“(this) gives us access to, and comprehension of, how this world is functioning”*, and *“it has also given us an outcome”*. The firm representatives describe the orchestrators’ present internal role in the network in the following words: *“I perceive her as a part of the glue”*. *“She is Healthinnovation”*. *“She is the key to our development”*. She is definitely also described as a doer and a decision maker: *“She just does it; we need someone who just does it. There is no need to discuss; we just do it this way.”* She is also described as a strict and strong leader. *“She is the project leader; ergo she runs her project and picks up the loose ends. It is nearly the role of a mother, keeping track of us, and ‘have you done that? – and now we need it back, because we have some deadlines’.”* *“She can be critical and rebuke us.”* *“She is right about being disciplined, and tells us ‘you have to do that, I insist, if not you are off’”*. In a national seminar in September 2010, the national director of the Arena program, a national funding program, made the following statement about the Healthinnovation project: *“If this project had not had such a strong, clear and bold network orchestrator, it would not have worked”*. During our interviews one year later, the firm representatives, unasked, strongly emphasized the same view. They, moreover, stressed her insight, her large network, her strategic capability and forward leaning. *“Most importantly she is keeping the network together, and herds the flock.”*

The practical projects required openness and transparency between the firms' technological platforms, which increased the need for a system that regulated their intellectual property's rights and obligations. The orchestrator took the job of effectuating this requirement in two ways: 1) She contacted a lawyer to develop a system, and she spanned the boundaries to get the job funded. 2) She succeeded in getting € 30 000 in funding from Innovation Norway. As one firm representative commented, "*The firms do not have the opportunity to search for such money by themselves.*"

To further develop the firms' technology, research competence from larger universities was required and, on that front, the orchestrator has been "*very clever in achieving contact with different environments. It is her merit that we are now in collaboration with the universities in Agder and in Oslo.*" In addition to the firms, both the regional university and Drammen municipality cooperate in this project. Their intention is, among other factors, to connect research projects and PhD candidates to the network.

### ***The Sustainment phase and network results***

Although the network bears signs of being in the growth phase, it has in some ways also reached sustainment, in that it has a focused orientation and increasingly takes advantage of synergies and external knowledge (Menzel & Fornahl, 2009:227). In the autumn of 2012, three and a half years after 'the new emergence', the network cooperation has yielded notable results for the firms, the public sector and the university: Three new firms are established, one as a spin-off from another firm, one as a joint venture, and one for branding, marketing and sale of the common products and solutions. Moreover, a Health Science Center was opened at the university. This center is an advanced technology lab, a physical meeting place and arena for knowledge exchange between the industry, the public health sector, the university and the

public. It is furnished with the products from the network firms and it serves different functions, such as a training lab for nursing students, a research lab for master students, researchers and firms, as well as a show-room for the firms.

In addition to Drammen municipality, the network collaborates with several smaller municipalities, to develop solutions for home-based care. The results are also visible through greater openness and transparency between the firms, also with respect to their technological platforms. The actors have defined mutual unique knowledge, mutual opportunities, common goals and strategies, and common innovation projects. The network's vision is "Better health where you are" and their mission is "to develop profitable health and care solutions" (Helseinnovasjon, 2012). The strategic plan for the network further states that "joint projects constitute the glue in the network" and underscores the importance of external collaboration, in particular with the public sector and research institutions. The survey shows that access to new and important knowledge, increased focus on the industry from the media and the governmental institutions, and building local and regional networks are the most important benefits of network participation.

Moreover, according to the orchestrator, "*An 'insane' trust-capital has now developed among the participants*". The firms also acknowledge an increased level of trust. Five applications have been developed for a regional research fund, of which three have received funding. Furthermore, the participants have signed binding agreements in order to regulate rights and obligations. Thus, the network is not merely a loosely coupled network.

Several results are achieved at the regional university. The Department of Health Science, with historically strong ties to the public sector and public hospitals, has now also turned its



attention towards cooperation with the private industry. As a firm representative expressed in a workshop in September 2010, “*The University distinguishes itself by its willingness to make use of technology and demonstrates a desire to change*”. Practitioners from the firms are mobilized as lecturers for the nursing students. The combination of two fields – healthcare and technology – in this network appears to have had a rub-off effect and has contributed to increased interaction within the regional university. This, in turn, has resulted in the initiation of a new study program: Health Technology. This program, the development of which is financed by the county administration, is envisaged to fit into a Master’s program in nursing.

The survey shows that the most important activities in binding the network together are: public funding, the orchestrator, the informal conversations at network events, the overnight stays and finally the strategy processes. A large part of the public funding pays the salary of the orchestrator, who is in charge of organizing the events, the strategy processes and the overnight stays. Such findings therefore highlight and confirm the great importance of the role of the networks orchestrator in this network.

## **Discussion**

This chapter starts with a discussion of the different roles of the orchestrator in each of the network’s lifecycle phases. Consequently, we propose a framework for the most salient roles of the network orchestrator in the different phases. Finally, limitations and further research are discussed.

In *the emergence phase*, the orchestrator mapped out and visited the potential firms, hence the visible role here is that of a knowledge broker. In *the decline phase* the orchestrator discovered that the domain was too narrow, that important actors from the industry and the

public sector were more or less absent, and that the network was kept artificially alive by public funding. She takes on a leader's role and expresses the crisis clearly. In *the new emergence phase*, the orchestrator makes strategic decisions and implements them at a high speed. In this phase she follows a classical approach to strategy with particular focus on the internal and external analysis (Porter, 1985). Based on these analyses she notes that there is a divergence between, on the one hand, the mission and goals of the network and, on the other, the resources and interests of the participating actors. She acts as a network entrepreneur (Burt, 2000), which entails refocusing the whole network and replacing the members and the board. Moreover, she lays the foundation of her own role as an inseparable part of the network itself (Kirkels & Duysters, 2010), in spite of the fact that she represents a third party. In this emergence phase, the network orchestrator also acts as knowledge broker, 'translating' (Clegg et al., 2004) the needs of the health care market to the technological firms. She frames the health care market in a perspective that the technological firms understand (Brown & Duguid, 1998; Etienne Wenger, 1998). She is also a knowledge activist (von Krogh et al., 2000) in that she increases her knowledge through interaction with the firms and transfers this knowledge to the new firms that she visits, producing a snowball effect. In her role as a knowledge broker she facilitated common meeting places, which was done systematically through the foresight process. The network is characterized by the complementarities of the competence and specialties of the members. There are three main member groups: SMEs (technological firms), public sector institutions and R&D institutions, hence the members belong to different spheres with quite different logics. The network orchestrator was a knowledge activist who provided the necessary conditions, and focused on building trust and knowledge redundancy (Nonaka, Toyama, & Konno, 2000). In the new emergence phase, the role as leader and strategist was prominent. The orchestrator appears to have a classical approach to strategy and strategic analysis. Likewise, in the transition process, she identified

important issues in the participants' domain, including pointing out to the industrial actors the great potential in the "new" municipal market, where they could use their core-competence (Hamel & Prahalad, 1994).

In *the growth phase*, the orchestrator performed the role of innovation broker, which enabled the member firms to innovate (Winch & Courtney, 2007), at the same time as the members perceived her as their ambassador. She acted more like the manager of a company than of a network, and succeeded in withholding the interest and the trust of the network firms through acting as a leader and strategist. However, she enacted only to a lesser degree *the independent role*, that Hanna and Walsh (2002) call for. Despite her affiliation with the independent NAO, she quickly became an embedded actor in the network, and the firms appeared to look to her for direction of action. The authority based on expertise appeared to be more salient than the formal role (Huysman, 2004), as many of the quotes above demonstrate.

In the growth phase, the network orchestrator additionally took on the network entrepreneur role (Burt, 2000) in building the network, e.g. outlining a system of agreements and contracts, including relations to external stakeholders. Network stability and network health are in focus here, and - the two factors being loosely coupled due to the nature of the network - this is crucial at this phase (Orton & Weick, 1990). The firms will take stock and determine whether the network creates value for them; based on the conclusion, they will decide whether to continue as members. The orchestrator built and maintained trust and social capital - or "the glue", as labelled by the informants - through her role as leader. This role is based on the knowledge of the network practice (Huysman, 2004).

In *the sustainment phase* several results became visible. The network definitely contributed to innovation for its participants by opening the new market: the municipality (market innovation), utilizing R&D in product development, cooperating with new actors in PPEs and the Health Science Centre (process innovation), promoting joint development of new products and the shared platform (product innovation), as well as fostering entrepreneurship (new firms). Although boundary spanning for funding is still important in this phase, the importance of the roles of knowledge broker and network entrepreneurs seems to decrease. The roles of innovation broker and network leader and strategist, however, seem to be crucial in the sustainment phase.

The emergence of, and the emphasis on, the role as leader and strategist contribute to a broader understanding of the orchestration role in an SME network. The role as leader and strategist, furthermore, exceeds the dimension of leadership and strategic management that we have found in the existing literature on network orchestration, and increases our understanding of the network orchestrator phenomenon. Due to the dramatic transition and the impressive and fast results, we argue that the case of Healthinnovation contributes to increased understanding and theory development. On this basis, a new framework for the role of network orchestrator in the different lifecycle phases is developed here. In this framework, the *first* and the *new* emergence phases are merged into a phase labelled *emergence*. The framework is presented in table 2.

**Table 2:** Important roles for the network orchestrator in the different lifecycle phases

Lifecycle phase	Knowledge broker	Network entrepreneur	Innovation broker	Network leader
Emergence	X	X		X
Decline				X
Growth		X	X	X
Sustainment			X	X

A single case study is a limited base for outlining a general theory. Therefore, further studies are needed, preferably in other industries and national contexts. Despite the longitudinal character of the study, we do acknowledge that six years in the life of a network is a short time span, considering the time it takes to develop products and becoming established in new markets. The findings need to be followed up in further studies, while the framework needs further testing.

### **Concluding remarks**

This paper opens the “black box” – the roles of the orchestrator – and maps out the roles that constitute this multifaceted and complex position. It does this by an extensive literature review and a six-year longitudinal in-depth case study of Healthinnovation, a network of small and medium-sized technological firms. In the various phases of the network’s lifecycle, the orchestrator performs a range of activities and processes that is categorized into four, different roles, somewhat overlapping: knowledge broker, network entrepreneur, innovation broker and network leader. In addition to identifying these roles, the paper explores whether the prominence of the different roles may vary according to the networks’ lifecycle.

The answer to the research question: “What are the roles of the orchestrator during the lifecycles of innovative SME networks?” is that the role of *knowledge broker* seems to most important in the emergence phase, while the role of *network entrepreneur* is salient in the emergence and the growth phases. Moreover, the role of *innovation broker* seems to be most important for the orchestrator in the growth and the sustainment phases. Finally, and interestingly, the role of *network leader* seems to be crucial in all the four phases. Therefore,

the role of network leader seems to be the most prominent one for the network orchestrator. The main characteristics of this role are that of strategist following a classical strategic management course. The orchestrator appears to have authority based on expertise, but the role is performed as if it was based on a formal position. Because of the weak formal power, the fragile feature of a network and the competition with the member enterprises' own strategy, this leadership role is complicated.

The study has theoretical and practical implications. Theoretically, the study contributes to the theory of third-party intermediaries and network leadership by the development of a new framework and a new understanding of the orchestration of SME networks. The main contribution lies in the focus on the network orchestrator as a leader, and we claim that this role bears similarities to the role of a leader and strategist of a single firm. This has received little attention in the existing literature. The new framework is based on a multitude of literature, which to a varying degree relates to the network orchestration roles, both for inter-organizational and intra-organizational networks. The study, moreover, contributes to the network literature by its longitudinal as well as process- and outcome oriented features. It also illustrates a successful story of an intentional creation of an innovative network, which is a phenomenon disputed in the innovation system literature (e.g. in Miettinen, 2002). Practically, the increased understanding of the different roles of network orchestration, with its multifaceted and complex features, has implications for network orchestrators, third-party intermediaries, network boards, network participants and policy makers that use the creation of networks as a tool to obtain increased regional innovation.

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## References

- Balkundi, P., & Kilduff, M. (2005). The ties that lead. A social network approach to leadership. *Leadership Quarterly*, 17(4), 419-439.
- Barney, J. B., & Hesterly, W. S. (2012). *Strategic Management and Competitive Advantage. Concepts and Cases*. Upper Saddle River: Pearson Education Ltd.
- Batterink, M. H., Wubben, E. F. M., Klerkx, L. W. A., & Omta, S. W. F. O. (2010). Orchestrating innovation networks: The case of innovation brokers in the agri-food sector. *Entrepreneurship & Regional Development*, 22(1), 47-67.
- Brown, J. S., & Duguid, P. (1998). Organizing knowledge. *California Management Review*, 40(3), 90-111.
- Brown, J. S., & Duguid, P. (2001). Knowledge and Organization: A social-Practice Perspective. *Organization science*, 12(2), 198-213.
- Burt, R. S. (2000). The Network Entrepreneur. In R. Swedberg (Ed.), *Entrepreneurship* (pp. 281-307). Oxford: Oxford University Press.
- Clegg, S. R., Kornberger, M., & Rhodes, C. (2004). Noise, Parasites and Translation: Theory and Practice in Management Consulting. *Management Learning*, 35(1), 31-44.
- Cooke, P., & Wills, D. (1999). Small Firms, Social Capital and the Enhancement of Business Performance Through Innovation. *Small business Economics*, 13(3), 219.
- Currie, G., Grubnic, S., & Hodges, R. O. N. (2011). Leadership in Public Services Networks: Antecedents, Process and Outcome. *Public Administration*, 89(2), 242-264.
- Czarniawska, B. (1998). *A narrative approach to organization studies* (Vol. 43). Thousand Oaks: Sage.
- Dhanaraj, C., & Parkhe, A. (2006). Orchestrating innovation networks. *Academy of Management Review*, 31(3), 659-669.
- Dyer, J. H., & Nobeoka, K. (2000). Creating and managing a high-performance knowledge-sharing network: The Toyota case. *Strategic Management Journal*, 21(3), 345-367.
- Eisenhardt, K. M. (1989). Building Theories from Case-study Research. *Academy of Management Review*, 14(4), 532-550.
- Etzkowitz, H., & Leydesdorff, L. (1997). *Universities and the global knowledge economy : a triple helix of university-industry-government relations*. London: Pinter.
- Freeman, C. (1991). Networks of innovators - a synthesis of research issues. *Research Policy*, 20(5), 499-514.
- Gausdal, A. H., & Nilsen, E. R. (2011). Orchestrating Innovative SME Networks. The Case of "HealthInnovation". *Journal of the Knowledge Economy*, 2(4), 586-600.
- Gould, R., & Fernandez, R. (1989). Structures of Mediation: A Formal Approach to Brokerage in Transaction Networks. *Sociological Methodology*, 19, 89-126.
- Hamel, G., & Prahalad, C. K. (1994). *Competing for the future. Breakthrough strategies for seizing control of your industry and creating the markets of tomorrow*. Boston: Harvard Business School Press.
- Hanna, V., & Walsh, K. (2002). Small firm networks: a successful approach to innovation? *R&D Management*, 32(3), 201.
- Hargadon, A. (1998). Firms As Knowledge Brokers: Lessons in pursuing continuous innovation. *California Management Review*, 40(3), 209-227.
- Hargadon, A., & Sutton, R. I. (1997). Technology Brokering and Innovation in a Product Development Firm. *Administrative Science Quarterly*, 42(4), 716-749.
- Heck, & Vervest. (2007). Smart business network. *Communication of the ACM*, 50(6), 28-37.

- Heidenreich, S., Landsperger, J., & Spieth, P. (2014). Are innovation networks in need of a conductor? Examining the contribution of network managers in low and high complexity settings. *Long Range Planning*, 49(1).
- Helseinnovasjon, A. (2012). About us. Retrieved from <http://www.arenahelseinnovasjon.no>
- Hoang, H., & Antoncic, B. (2003). Network-based research in entrepreneurship - A critical review. *Journal of Business Venturing*, 18(2), 165-187.
- Hogg, M. A., Van Knippenberg, D., & Rast, I. D. E. (2012). Intergroup Leadership in Organizations: Leading across Group and Organizational Boundaries. *Academy of Management Review*, 37(2), 232-255.
- Howell, J. M., Shea, C. M., & Higgins, C. A. (2005). Champions of product innovations: defining, developing, and validating a measure of champion behavior. *Journal of Business Venturing*, 20(5), 641-661.
- Howells, J. (2006). Intermediation and the role of intermediaries in innovation. *Research Policy*, 35(5), 715-728.
- Huysman, M. (2004). Communities of practice. Facilitating social learning while frustrating organizational learning. In H. Tsoukas & N. Mylonopoulos (Eds.), *Organizations as knowledge systems: Knowledge, learning and dynamic capabilities* (pp. 67-85). New York: Palgrave Macmillan.
- Hällgren, M., & Söderholm, A. (2010). Orchestrating deviations in global projects: Projects-as-practice observations. *Scandinavian Journal of Management*, 26(4), 352-367.
- Kirkels, Y., & Duysters, G. (2010). Brokerage in SME networks. *Research Policy*, 39(3), 375-385.
- Klerkx, L. W. A. (2008). *Establishment and embedding of innovation brokers at different innovation system levels: insights from the Dutch agricultural sector*. Paper presented at the The Proceedings of the Conference Transitions towards sustainable agriculture food chains and peri-urban areas, Wageningen.
- Klerkx, L. W. A., & Aarts, N. (2013). The interaction of multiple champions in orchestrating innovation networks: Conflicts and complementarities. *Technovation*, 33(6-7), 193-210.
- Landsperger, J., & Spieth, P. (2011). Managing innovation networks in the industrial goods sector. *International Journal of Innovation Management*, 15(6), 1209-1241.
- Landsperger, J., Spieth, P., & Heidenreich, S. (2012). How network managers contribute to innovation network performance. *International Journal of Innovation Management*, 16(6), 21 pages.
- Lissoni, F. (2010). Academic inventors as brokers. *Research Policy*, 39(7), 843-857.
- Menzel, M.-P., & Fornahl, D. (2009). Cluster life cycles—dimensions and rationales of cluster evolution. *Industrial & Corporate Change*, 19(1), 205-238.
- Miettinen, R. (2002). *National innovation system : scientific concept or political rhetoric*. Helsinki: Edita.
- Mintzberg, H. (1973). *The Nature of Managerial Work*. New York: Harper Row.
- Müller-Seitz, G. (2012). Leadership in Interorganizational Networks: A Literature Review and Suggestions for Future Research. *International Journal of Management Reviews*, 14(4), 428-443.
- Nonaka, I., Toyama, R., & Konno, N. (2000). SECI, Ba, and Leadership: A Unified Model of Dynamic Knowledge Creation. *Long Range Planning*, 33(1), 5-34.
- Orton, J. D., & Weick, K. E. (1990). Loosely Coupled Systems: A Reconceptualization. *Academy of Management Review*, 15(2), 203-223.
- Paquin, R. L., & Howard-Grenville, J. (2013). Blind Dates and Arranged Marriages: Longitudinal Processes of Network Orchestration. *Organization Studies*, 34(11), 1623-1653.



- Pawlowski, S. D., & Robey, D. (2004). Bridging User Organizations: Knowledge Brokering and the Work of Information Technology Professionals. *MIS Quarterly*, 28(4), 645-672.
- Pittaway, L., Robertson, M., Munir, K., Denyer, D., & Neely, A. (2004). Networking and innovation: a systematic review of the evidence. *International Journal of Management Reviews*, 5/6(3/4), 137-168.
- Popp, J., MacKean, G., Casebeer, A., Milward, H., & Lindstrom, R. (2013). Inter-organizational networks.
- Porter, M. (1985). *Competitive Advantage. Creating and Sustaining Superior Performance* (Vol. Free Press). New York.
- Porter, M. (1998). Cluster and the new economic of competition. *Harvard Business Review*(November - December), 77-90.
- Provan, K. G., Fish, A., & Sydow, J. (2007). Interorganizational Networks at the Network Level: A Review of the Empirical Literature on Whole Networks. *Journal of Management*, 33(3), 479-516.
- Provan, K. G., & Kenis, P. (2008). Modes of Network Governance: Structure, Management, and Effectiveness. *Journal of Public Administration Research & Theory*, 18(2), 229-252.
- Pyke, F., & Sengenberger, W. (1992). *Industrial Districts and Inter-Firm Co-operation in Italy*. Geneva: International Institute of Labour studies.
- Ruckdäschel, S. (2014). *Leadership of Networks and Performance: A Qualitative and Quantitative Analysis*: Springer.
- Siggelkow, N. (2007). Persuasion with case studies. *Academy of Management Journal*, 50(1), 20-24.
- Soekijad, M., van den Hooff, B., Agterberg, M., & Huysman, M. (2011). Leading to Learn in Networks of Practice: Two Leadership Strategies. *Organization Studies* (01708406), 32(8), 1005-1027.
- Sydow, J., Lerch, F., Huxham, C., & Hibbert, P. (2011). A silent cry for leadership: Organizing for leading (in) clusters. *The Leadership Quarterly*, 22(2), 328-343.
- Sydow, J., Schüssler, E., & Müller-Seitz, G. (2016). *Managing inter-organizational relations: Debates and cases*: Palgrave Macmillan.
- Szulanski, G. (1996). Exploring Internal Stickiness: Impediments to the Transfer of Best Practice within the Firm. . *Strategic Management Journal*, 17, 27-43.
- von Krogh, G., Ichijo, K., & Nonaka, I. (2000). *Enabling Knowledge Creation. How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation*. Oxford: Oxford University Press.
- Wenger, E. (1998). *Communities of Practice. Learning, Meaning, and Identity*. Cambridge: Cambridge University Press.
- Wenger, E., McDermott, R., & Snyder, W. M. (2002). *Cultivating Communities of Practice. A guide to managing knowledge*. Boston: Harvard Business School Press.
- West, J., & Bogers, M. (2014). Leveraging External Sources of Innovation: A Review of Research on Open Innovation. *Journal of Product Innovation Management*, 31(4), 814-831.
- Winch, G. M., & Courtney, R. (2007). The Organization of Innovation Brokers: An International Review. *Technology Analysis & Strategic Management*, 19(6), 747 - 763.
- Yin, R. K. (2014). *Case study research : design and methods* (5th ed.). Thousand Oaks, California: Sage Publications.

