Orchestrating innovative networks.
The case of 'HealthInnovation'.

Anne Haugen Gausdal[1]
and
Etty Ragnhild Nilsen[2]

Written for the 5th International Seminar on Regional Innovation Policies, 14. – 15. October 2010 - University of Agder - Grimstad

Abstract

This is a longitudinal study of a network in a dramatic transition from 2008-2010. The study focuses on how an innovation broker may orchestrate the creation of a regional network. Based on the literature on network orchestration and on communities of practice, it aims to develop a new framework for network orchestration. The network under study emerged as 'a good idea' in the regional university, but it soon proved to be poorly rooted in the regional industry and with the public sector in the region. However, as a result of intensive orchestration and facilitation by an external innovation broker, it has become a dynamic and innovative network with active firms and an active public sector. The research question is: What is the role of an external innovation broker in orchestrating the creation of innovative networks? The paper focuses on the importance of network orchestration in early phases of network development and develops a new framework for orchestration of networks of independent SMEs.

[1] VRI Buskerud and Vestfold University University, anne.h.gausdal@hive.no
[2] VRI Buskerud and Buskerud University University, etty.nilsen@hibu.no

1 Introduction

In the learning economy and in times of increasing globalization, geographical proximity and regional co-operation paradoxically appears to have increased importance to firms' competitiveness (Maskell, Eskelinen, Hannibalsson, Malmberg, & Vatne, 1998; Saxenian, 1994). Such cooperation often happens in the form of networks. This paper focuses on how an external innovation broker may orchestrate (Dhanaraj & Pharkhe, 2006) the process of creating a network. It aims to develop a new framework for the orchestration process.

The paper contributes to the debate of network orchestration, e.g by including elements from communities of practice (Brown & Duguid, 2000; Gausdal, 2008; Wenger, 1998). Network orchestration and the role of third parties, like external innovation brokers, in network creation and development has been underresearched (Pittaway, Robertson, Munir, Denyer, & Neely, 2004), and as Batterink et al state: "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" (2010b). There is a huge and rapidly growing literature about how regional co-operation and innovative networks work (for an overview see Asheim, Cooke, & Martin, 2006; Freeman, 1991; Hoang & Antoncic, 2003; Thorgren, Wincent, & õrtqvist, 2009). One should expect this literature to encompass a broad discussion on how to *develop* appropriate forms of co-operation, but such discussions are relatively rare. For instance, "we still know little, theoretically and empirically, about how clusters develop and evolve" (Nooteboom, 2006: 137). It is, however, heavily disputed whether an innovative network can be created from the outside is (e.g. in Miettinen, 2002). This paper also contributes to the debate on emergent, bottom up cooperation and networks versus organized and facilitated networks (Gausdal, 2008; Miettinen, 2002). Further; Hoang and Antoncic (2003) ask for more 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". Therefore a longitudinal, mostly qualitative and inductive, process-oriented case study with some elements of action research has been conducted.

This paper holds a longitudinal study of an experimental project creating a regional innovative network – HealthInnovation – from 2006 to 2010. The network combines two business sectors, healthcare and technology, a combination that is new to the region. In 2009, the network underwent a dramatic transition; facilitated by an external innovation broker. From

being a heavily orchestrated good idea launched by the regional university, but without being rooted in the regional business or the public sector; it has become a dynamic network with active firms and an active public sector. HealthInnovation aims to develop a national leading innovation- and knowledge environment within the healthcare technology field in the Norwegian region of Drammen. It is owned by a broad regional partnership and in operation at the time of writing. Moreover it is carried out under the auspices of the national business development and research programmes Arena (since the autumn of 2007) and VRI (since the autumn of 2008). The research question is: *What is the role of an external innovation broker in orchestrating the creation of innovative networks?*

2 Network orchestration

Network orchestration was originally defined by Dhanaraj and Parkhe (2006) as the set of deliberate, purposeful actions undertaken by a hub firm to create value (expand the pie) and extract value (gain a larger slice of the pie) from the network. An innovation broker is defined as "an independent actor in the network, and not part of any of the organizations or enterprises in the network" (Haga, 2009 :19). According to Dhanaraj & Pharkhe (2006) the orchestration process consists of three processes: managing knowledge mobility, managing knowledge appropriability and managing network stability. Their model for network orchestration is developed for large networks managing up to more than 500 alliances simultaneously with a dominant hub firm. Such networks are typically frequent in supplier networks in the car industry. Many innovative networks like the one under study, lack the dominant firm (hub firm) and consist of a small number – often 10-30 – interdependent firms, typically SMEs. We argue that these latter kinds of networks require a somewhat different kind of network orchestration. Among other factors because they are smaller, have different power structures and are loosely coupled to a high degree (Weick 1976).

Haga (2009) presents a networking model where network orchestration of independent networks of SMEs is outlined as five main "enablers" that enable networking processes to emerge. These enablers are: Network management, network infrastructure, training programs, leadership and processing roles. *Network management* consists of building internal resources, relationship to regional actors and funding. *Network infrastructure* consists of internal development of organizations, stimulating joint innovation projects and building sub networks. *Training programs* should be organized to develop knowledge and skills, common practice and common language. *Leadership* consists of involving the leadership of the

membership organizations' and union leaders to take part in the network. *Processing roles* consists of bringing in experience, expertise and connecting enterprises. Haga (2009) emphasises conscious and carefully interplay among the enablers as an important orchestrative task to be performed by the broker. We argue that these enablers are dependent on the three orchestration processes: managing knowledge mobility, managing innovation appropriability and managing network stability (Batterink, Wubben, Klerkx, & Omta, 2010a; Dhanaraj & Pharkhe, 2006). *Managing knowledge mobility* is at the core of an innovative network, since knowledge is the key resource and knowledge sharing and knowledge creation are the key processes. Managing knowledge mobility involves sharing, acquiring and deploying knowledge (Dhanaraj & Pharkhe, 2006). Knowledge is inherently sticky (Szulanski, 1996), which means that knowledge will stay within organizational boundaries unless mobility is managed. Managing knowledge mobility includes facilitating common meeting places for learning , and must overcome obstacles like tacit knowledge, epistemic barriers, lack of trust (Brown & Duguid, 2001), diverging vocabulary etc. *Managing innovation appropriability*, is highly dependent on managing knowledge mobility. The ability to recognize innovative ideas and develop them further in a generative dance between tossing of ideas and realistic development of viable projects is critical in innovative networks: *Managing network stability* is important because such networks are voluntarily formed and labeled, loosely coupled (Orton & Weick, 1990) and fragile.

We argue that the literature on network orchestration lack elaboration on 1) the role of the innovation broker during network creation and 2) failing networks and strategy for recovery. To fill this shortage we have searched elsewhere for supplement. The role of the innovation broker or network coordinator, as we have chosen to label the broker, is described in various shapes in the literature. Dhanaraj and Parkhe (2006) label this function a 'network orchestrator', while Batterink et al. (2010) in a review of these different shapes use the term 'innovation broker'. Wenger et al. (2002) label this function a 'community coordinator'. In a large quantitative study, Thorgren et al (2009) term this function the 'governance structure' and operationalize it as 'size of administrative function=network board size'. In relevance to this study we do not consider network board size to inform the facilitating dimension of governance structure, and it does not appear that Thorgren et al include the role of the innovation broker in their study.

Saxenian (1994) and Keeble and Wilkinson (1999) acknowledged the influence of communities in facilitating regional collective learning in networks. The literature on communities of practice (CoP) (Lave & Wenger, 1991), networks of practice (NoP) (Brown & Duguid, 2000) and regional communities of practice (Gausdal, 2008) is vast and shows that the most critical factor in a community is the vitality of its leadership (Wenger, McDermott, & Snyder, 2002). CoP, as born out of the theory of situated learning, has proceeded along different trajectories: One is theoretical in orientation representing the practice turn in social sciences. The other is more managerial, with communities of practice having developed into a tool kit. According to the CoP framework, by performing a number of key functions, the broker helps the community focus on its domain, maintain relationships and develop its practice (Wenger et al., 2002). We argue that the processes performed by a community coordinator (broker) in regional CoPs correspond to several of the processes of network orchestration, and supplement it. These are compared in table 1.

Table 1. Comparison of the content of processes in network orchestration and CoP leadership.

Network orchestration		**CoP**
Dhanaraj & Pharkhe, 2006	**Haga, 2009**	**Wenger, McDermott, & Snyder, 2002**
• Manage knowledge mobility	• Network management • Network infrastructure	• Plan and facilitate CoP events • Informally link CoP members • Manage the boundaries between the CoP and the formal organization
• Manage innovation appropriability	• Organize training programs • Involve the leadership of the membership organizations'	• Foster development of CoP members
• Manage network stability	• Perform processing roles	• Building the practice
		• Identify important issues in the members' domain
		• Assess the health of the CoP and evaluate its contribution to members

As the comparison shows, two processes of CoP leadership are supplementing the literature of network orchestration: 1) Identify important issues in the members' domain and 2) Assess the health of the CoP and evaluate its contribution to members. Identifying the domain is vital to a community of practice since the common interest for a domain is the glue in the community and a shared competence that distinguishes members from others (Wenger, 2007). The process of identifying important issues in the domain is a process of increasing the awareness of the features of the domain. The evaluation of the Cop's contribution to its members is of

particular interest in a network of SMEs. They will immediately ask: “What is in it for me?” In an innovative network, value will be measured in new projects and innovation. Several contributions, however, call for using “nontraditional methods to assess the value of the company’s communities of practice” (Wenger & Snyder, 2000:144), and not necessarily make sharp distinctions between innovations and incremental development (Haga, 2009).

It can be argued that the communities of practice framework was outlined for intraorganizational life and not with networks in mind. In communities of practice, social relations are created around work. These social relations imply that the joint enterprise exceeds reaching the goal of the task itself; it is also the collective process of getting there and creating a mutual accountability on the way. The work itself is what assembles the individuals that form the social relations, and through work, the identities form and knowledge develop. In a network context *work* in itself is not necessarily the common denominator, and one could argue that the framework is ill suited. We argue with several others (Brown & Duguid 2000; Gausdal, 2008), that the processes of learning and collective reflection needed for innovation and knowledge creation, which are the basis for communities of practice – also prevail in a network context. The obstacles take on a different form, and the role of the broker appears to be of additional importance. It is therefore profitable to draw on CoP theory within the network context, and in particular in the phase of creation and on the role of the broker.

3. Methods

This study was carried out during the period 2008-2010 using case study methodology (Eisenhardt, 1989; Yin, 1984) and longitudinal data (Pettigrew, 1990). In this study we aim to develop a new framework and according to Yin (1984) and Eisenhardt (1989), case is an appropriate research strategy for theory generation. A single-case provides the opportunity for unusual research access allowing exploration in a specific population (Yin, 1984) and provides opportunities to explore and richly describe the existence of a phenomenon (Siggelkow, 2007). Yin (1984) suggests, however, that multiple-case studies typically provide a stronger base for theory-building. Nevertheless, a single-case can be a very powerful example providing a more convincing argument about causal forces than broad empirical research (Flyvbjerg, 1991; Siggelkow, 2007).

Data was collected through observation, conversations and interviews. The researchers participated in the workshops, partly as regular participants (researchers), and on a two

occasions as facilitators of the processes in the workshops. Data has been analyzed using an interpretive approach. Threats to validity have been met through researcher triangulation and continuous contact with the broker.

In the following we will discuss the development of the HealthInnovation network in light of the categories in table 1 and particularly focused on the role and actions taken by the broker in the process of creating a network.

4. The HealthInnovation project – the story

In 2006 the Norwegian region of Drammen targeted health as a focused area for a development project. This has however not been an obvious emphasis, it has matured over some time, and has involved several detours and penalty rounds. The ripening of the project is of special interest, since it is a story of ideas that have emerged from various sources, and hence of the importance of founding such projects with the regional actors. It has been a search for competitive advantage and regional excellence à la Porter, but additionally it has been vital to focus on national and international trends in order to secure both the present and future demand for products and services. After a process in a broad regional partnership, an application was developed for the national Arena program (Innovation Norway), and the project got funded from Arena in late 2007. In 2008 the project also received funding from the National Research Council and the county authorities through the national VRI funding program (VRI: Program for Regional R&D and Innovation).

The idea for this project was born in academia; in the regional (state owned) university. Inspired by the idea of triple helix (Etzkowitz & Leydesdorff, 1997), the project started out as an experiment to combine the research environments at the Department of Health Sciences and the Department of Optometry and Visual Science at the regional university, the public sector and the regional industry. Through cooperation between research and innovation – to develop a new research area and industry in Health and lighting; focusing on the health promotion effect of correct and adjusted light for people with different needs, for instance at work and in nursery homes for dement people. It started out at the university where the two university departments had several meetings for discussing ideas and possibilities in the project, and building relationships and ties (Granovetter, 1973). The atmosphere at these meetings is characterized as enthusiastic and optimistic with an expressed and mutual desire for future cooperation and belief in research cooperation and giving birth to a new industry.

The two departments – Health sciences and Optometry and Visual Science – had however scarce experience in cooperating with each other, and their experiences from from cooperation with industrial actors and public sector were quite different, and this was of great significance to the network: The Department of Health Science was familiar with cooperating with the public sector, since they trained their students at the regional (state owned) hospital and municipality owned nursery homes and health institutions, but they lacked experience in working with the industry. The Department of Optometry and Visual Science, on the other hand, had less experience from cooperation with the public sector, but were familiar with the industry, especially through research commissions. The regional hospital and the healthcare sector in Drammen municipality constitute the public sector in this project. Except for training nursing students these public organizations had little experience in cooperating with the university and the industry on research and innovation.

In 2008 a new project manager was engaged from a regional innovation center, the innovation broker. The innovation broker spent a lot of time mapping and visiting possible firms to join the project, both inside and outside the region. Despite her efforts, very few relevant firms were discovered. She put a lot of effort in mobilizing the regional hospital and the municipality. The regional hospital cancelled most of the meetings, and showed very little interest, whereas the municipality showed more enthusiasm. In a mapping process performed by the department of Health Sciences it emerged that the capability for R&D cooperation with external partners, like industry and public sector, was relatively low. Moreover the enthusiasm from the initial phase seemed to having decreased at the two involved university departments. Taken together, the project was in a state of crisis. It was born in academia, but appeared not to be rooted in the regional industry or in the public health sector.

Instead of using effort doing more of the same, the project manager suggested and implemented radical changes; refocusing the project and reorganizing the board. She managed the project trough a dramatic transition, and towards the end of 2008 and early 2009, the board was reorganized and the head of the board was now a manager from an innovative technological firm. As she expressed later “I had to tell the participants that the baby is ugly – and is not entitled to life”. The original focus on Health and lighting was replaced with a broader focus – on health and technology – and the project was renamed HealthInnovation.

Once again the project manager performed a mapping of the relevant regional companies, mainly by visiting firms in person. She allocated 2-3 months, developed an interview guide, and visited 40 firm managers. The most important questions were: Are you interested in innovation? Are you interested in cooperating with regional knowledge institutions? Are you interested in R&D. She challenged the managers on their market situation and asked them to reflect upon whether their core technology possibly could be relevant in the rapidly growing healthcare market. For instance, she asked firms in the constructing industry specializing in to consider patient lifts, and firms developing multimedia software for analyzing sport events were asked to consider using the same software for analyzing X-rays and ultrasound inspections. The project manager succeeded in motivating 12 firms with relevant technology to cooperating in the refocused HealthInnovation network. Their core competence was largely on ICT and technology, few firms were experienced in using research and all but one firm had no previous experience within the health market. A common denominator in the new group of firms was the desire to use external R&D resources and the desire to cooperate with the regional university. They were unsure about how to approach the university, and saw this as an opportunity to connect. Their contact with the university had so far been limited to contact with students from the Department of Technology, while now they needed knowledge and expertise also from the Department of Health science and not only with the students; but also with the researchers. Hence, the network was refocused and several firms were recruited as network members. The next challenge was to develop a common vision, manage knowledge mobility, network stability and prepare for innovation.

I the spring of 2009 the broker initiated a plan to organize five workshops during a year for the members of HealthInnovation. The aim was to develop a common and deeply rooted vision and strategy and strengthen the sense of connectedness. The broker put a lot of effort into motivating the actors for participation in the workshops, and as one of the participants expressed: the broker “worried me a lot in participating today, and I am so glad that I am here”. This resulted in participation from twelve firms, the university, the regional hospital enterprise and Drammen municipality. The workshops were organized as a foresight process, and each workshop lasted two days and entailed an overnight stay at a retreat. The first workshop concluded with consensus on ‘healthcare as an important marked for new technology in the near future’, with high hope of considerable increase in this market due to demographic development and decrease in the workforce. The participating organizations also

came to realize that their core competence and areas of expertise were complementary and fit to jointly develop concepts, products and organizational models towards forming a competitive edge in the healthcare market. An interest in and an acknowledgement of interaction and coopereation emerged among the actors during the subsequent workshops, and interaction and cooperation was increasingly seen as necessary means for achieving success within the healthcare technology market.

The workshops have given several important results for the firms, the public sector and the university. They have resulted in greater openness and transparency between the firms, also with respect to their technological platforms. The workshops therefore seem to hold a trust building effect. Moreover, the Department of Health Science at the regional university has been mobilized and their attention is turned towards cooperation with the industry. As one firm representative expressed in a workshop in September 2010 “The university distinguishes itself by its willingness of making use of technology and demonstrates a wish to change”. Practitioners from the firms are mobilized as lecturers for the nursing students. Traditionally there is little contact between the Department of Technology and the Department of Health Science in academia in general and in this specific university. However, the specific combination of fields –healthcare and technology – in this network appears to have had a rup-off effect and has contributed to increased interaction within the regional university. One result of this interaction is the initiation of a new project between the deans of the two faculties to develop a new subject in healthtechnology. This subject is developed to suit into a master program in nursing, and the development is financed from the county administration. The interaction in the workshop has, furthermore, resulted in a new project, also funded by Innovation Norway, entitled *Intelligent Healthcare Services*. Drammen municipality initiated a project parallel to the creation of this network. The project included building 16 senior citizens housing adopting new technology: senior citizen housing for the future. This proved to be an idea that the participants all found very exciting. It was already an idea, which meant the there would be some funding and it seemed realistic. Steps have since been taken to turn it into a project and to join forces with the municipality and researchers. In addition to the firms themselves, both the university and Drammen municipality are cooperating in this project, and their intention is, among other factors, to link research projects and PhD candidates to the project. This senior citizen house project is classified as a “public financed development project” (PFD). The actors in the network are in the time of writing working together at eight

other PFDs and have recently developed two applications for a regional research fund. The foresight workshops have therefore given several important results; increased trust among the actors, mobilizing of the regional university to cooperate with the industry, increased connectivity within the university and between the university, the industry, the regional hospital and the municipality, several new development projects, a new subject at the university.

Although the workshops were managed by an external consultant, the broker participated actively and played a visible role with clear standpoints. She challenged the participants on important decisions about the present and the future, e.g on funding a broker and secretary after the end of the Arena (public funding) period in 2012. The broker initiated the workshops, suggested to organize them as a foresight process, and performed clear and visible network leadership during the accomplishment of the workshops.

In September 2010 the participants are going to sign formal binding agreements in order to regulate rights and obligations. Hence the network will not merely be a loosely coupled network. Moreover, according to the broker "an insane trust-capital has now developed among the participants". In a public foresight seminar in September 2010, the national manager of the Arena program expressed the following statement about the HealthInnovation project: "If this project did not have such a strong, clear and bold network broker, it would not have worked".

5. Discussion

In the transition process, the broker identified important issues in the members' domain, including pointing out to the industrial actors that they had a potential market in common – using the core-competence framework (Hamel & Prahalad, 1994). She further assessed the health of the network and evaluated whether the network created value for its members or not. In this process, the broker discovered that Health and lighting was a relatively narrow domain that did not have a large market regionally; nor nationally. Moreover, this was meant to be a regional network and the relevant regional industry was more or less uninterested in this domain. The cooperation on research issues between the two departments at the regional university was difficult to initiate, and the number of relevant projects was close to zero. When assessing the health of the network and evaluating its contribution to the members, she discovered that the network did not contribute in stimulating innovation to its members –

mostly due to lack of active firms, a passive public sector and a very small market. The network was rather kept artificially alive by public funding.

The kind of network created here is a regional network of the actors of a Triple Helix (Etzkowitz & Leydesdorff, 1997); firms, public sector (government) and university. Cooke (2007) argues that to be innovative such networks need to have symmetric knowledge. To fulfill this, three criterions are required: 1) The quality of information among the actors need to be safe and of current interest. 2) The university needs to be research oriented and 3) Equilibrium in knowledge and innovation practice among the triple helix actors is required. Before the dramatic transition, the network had problems with all these criteria, but mostly with the third criteria; the university was definitely dominating the network and the two other actors, the industrial actors and the public sector, were more or less absent. By identifying the members' domain and evaluating the health of the network, the broker acknowledged that the network's original domain was problematic. Moreover, that the network had serious problems and did not create value for its members.

After the refocusing of the network's mission, the broker used a lot of effort revitalizing the network trough the original network orchestration processes – leadership of knowledge mobility, innovation appropriability and network stability – developed by Dhanaraj and Parkhe (2006). Such processes are not only stressed in the literature of network orchestration, but also in the network literature. Uzzi, for instance, states that social interactions, trust, rich information sharing, and joint problem solving are vital success factors for a network; rather than formal contracts (Uzzi, 1997). The main results in the HealthInnovation case are the creation of a common vision, increased connectivity and trust, and several new development and research projects. Hence the network is now definitely contributing to innovation for its members. It does this by opening a new market (market innovation), utilizing R&D in product development (process innovation), cooperating with new actors (process innovation) and joint development of new products (product innovation).

Concluding from this and merging the two processes, 1) identify important issues in the members' domain and 2) assess the health of the CoP, and evaluate its contribution to members, we argue that the existing literature on network orchestration lack the process of "managing network domain, health and vitality". A new framework for processes for network orchestration is therefore developed in table 2. This framework builds on the framework of

Dhanaraj & Pharkhe (2006) – which also suits networks of interdependent SMEs without a dominant hub firm, and adds elements from communities of practice:

Table 2. A new framework for network orchestration

New framework for network orchestration
• Manage knowledge mobility
• Manage innovation appropriability
• Manage network stability
• Manage network domain, health and vitality

A single case study is a limited base for generalizing, and further studies are needed. The aim of the study is however, to increase our understanding of the phenomenon and develop existing theory. Because of the dramatic transition and the impressive and fast results, we argue that HealthInnovation is a suitable case for increased understanding and theory development. The findings and exploratory analysis need to be followed up, and the framework needs further testing. Additional factors need further inspection; trust for one since trust is essential for innovative collaboration (Keeble, 2000). There is a need for further studies of how innovative networks are created and of how participation in a network creates value and influences the members of the network.

6. Concluding remarks

This longitudinal case study of a network creation process and how it was orchestrated has contributed to the development of a new framework for network orchestration. The framework builds on Dhanaraj & Pharkhe (2006) and is developed by combining theory on network orchestration with theory on communities of practice. The study also holds a successful story of creating an innovative network from the outside, which is disputed in the litterature (e.g. in Miettinen, 2002). The research question to be answered was: What is the role of an external innovation broker in orchestrating the creation of innovative networks? We argue that to orchestrate the creation of innovative networks successfully, an external knowledge broker needs to manage knowledge mobility, innovation appropriability, network stability, network domain, and health and vitality of the network. To manage health and vitality of the network includes evaluating the network's contribution to its members. If the evaluation shows an unhealthy network with little vitality, the broker's role includes initiation of actions to restore and revitalize the network.

References

Asheim, B. T., Cooke, P., & Martin, R. 2006. ***Clusters and regional development : critical reflections and explorations***. London: Routledge.

Batterink, M. H., Wubben, E. F. M., Klerkx, L., & Omta, S. W. F. 2010a. Orchestrating innovation networks: The case of innovation brokers in the agri-food sector. ***Entrepreneurship and Regional Development***, 22(1): 47-76.

Brown, J. S., & Duguid, P. 2000. Mysteries of the region: Knowledge dynamics in Silicon Valley. In C.-M. Lee (Ed.), ***The Silicon Valley edge a habitat for innovation and entrepreneurship***: xxiii, 424 p. Stanford, Calif.: Stanford University Press.

Brown, J. S., & Duguid, P. 2001. Knowledge and Organization: A social-Practice Perspective. ***Organization Science***, 12(2).

Cooke, P. 2007. Regional Innovation Systems, Asymmetric Knowledge and the Legacies of Learning. In R. Rutten, & F. Boekema (Eds.), ***The Learning region : foundations, state of the art, future***: 184-205. Cheltenham: Edward Elgar.

Dhanaraj, C., & Pharkhe, A. 2006. Orchestrating innovation networks. ***ACADEMY OF MANAGEMENT REVIEW***, 31(3): 659-669.

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.

Flyvbjerg, B. 1991. ***Rationalitet og magt***. København: Akademisk Forlag.

Freeman, C. 1991. Networks of Innovators - a Synthesis of Research Issues. ***Research Policy***, 20(5): 499-514.

Gausdal, A. H. 2008. Developing regional communities of practice by network reflection: the case of the Norwegian electronics industry. ***Entrepreneurship and Regional Development***, 20(3): 209-235.

Granovetter, M. S. 1973. The strength of weak ties. ***American Journal of Sociology***, 78 No 6: 1360-1380.

Haga, T. 2009. Orchestration of network instruments: a way to de-emphasize the partition between incremental change and innovation? ***AI and Soc***(23): 17-31.

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.

Hoang, H., & Antoncic, B. 2003. Network-based research in entrepreneurship - A critical review. ***Journal of Business Venturing***, 18(2): 165-187.

Keeble, D. 2000. Collective Learning Processes in European High-Technology Milieux. In D. Keeble, & F. Wilkinson (Eds.), ***High-technology Clusters, Networking and Collective Learning in Europe***: 199-229. Aldershot: Ashgate.

Keeble, D., & Wilkinson, F. 1999. Collective learning and knowledge development in the evolution of regional clusters of high technology SMEs in Europe. ***Regional Studies***, 33(4): 295-303.

Lave, J., & Wenger, E. C. 1991. ***Situated learning : legitimate peripheral participation***. Cambridge: Cambridge University Press.

Maskell, P., Eskelinen, H., Hannibalsson, I., Malmberg, A., & Vatne, E. 1998. ***Competitiveness, localised learning and regional development : specialisation and prosperity in small open economies***. London: Routledge.

Miettinen, R. 2002. ***National innovation system : scientific concept or political rhetoric***. Helsinki: Edita.

Nooteboom, B. 2006. Innovation, learning and cluster dynamics. In B. T. Asheim, P. Cooke, & R. Martin (Eds.), ***Clusters and regional development : critical reflections and explorations***: 137-163. London: Routledge.

Orton, J. D., & Weick, K. E. 1990. Loosely Coupled Systems: A Reconceptualization. ***Academy of Management Review***, 15(2): 203-223.

Pettigrew, A. M. 1990. Longitudinal field research on change: Theory and practice. ***Organization Science***, Vol. 1, no. 3: 267-292.

Pittaway, L., Robertson, M., Munir, K., Denyer, D., & Neely, A. 2004. Networking and innovation: A systematic review of the evinence. ***international Journal of Management Reviews***, 5-6(3-4): 137-168.

Saxenian, A. L. 1994. ***Regional advantage : culture and competition in Silicon Valley and Route 128***. Cambridge, Mass.: Harvard University Press.

Siggelkow, N. 2007. Persuasion with case studies. ***Academy of Management Journal***, 50(1): 20-24.

Szulanski, G. 1996. Exploring Internal Stickiness: Impediments to the Transfer of Best Practice within the Firm ***Strategic Management Journal***, 17: 27-43.

Thorgren, S., Wincent, J., & õrtqvist, D. 2009. Designing interorganizational networks for innovation: An empirical examination of network configuration, formation and governance. ***Journal of Engineering and Technology Management***, 26: 148-166.

Thorgren, S., Wincent, J., & Örtqvist, D. 2009. Designing interorganizational networks for innovation: An empirical examination of network configuration, formation and governance. ***Journal of Engineering and Technology Management***, 26(3): 148-166.

Uzzi, B. i. A., 42: 35-67. 1997. Social Structure and Competition in Interfirm Networks: The Paradox of Embeddedness. ***Administrative Science Quarterly***, 35-67(42).

Wenger, E. 2007. Communities of practice - a brief introduction: http://www.ewenger.com/theory/communities_of_practice_intro.htm Date accessed June 23rd 2007.

Wenger, E., & Snyder, W. 2000. Communities of practice: the organizational frontier. ***Harvard Business Review***(January-February): 139-145.

Wenger, E. C. 1998. ***Communities of practice : learning, meaning, and identity***. Cambridge: Cambridge University Press.

Wenger, E. C., McDermott, R., & Snyder, W. M. 2002. ***Cultivating communities of practice : a guide to managing knowledge***. Boston: Harvard Business School Press.

Yin, R. K. 1984. ***Case study research : design and methods***. Beverly Hills, Calif.: Sage Publications.