DEVELOPING BUSINESS NETWORKS THROUGH CLUSTER INITIATIVES - OR, DON'T MESS WITH MY NETWORK

Competitive paper

Possibly for Special track on
Cluster initiatives, networks and regional development

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ABSTRACT

Inspired by research on clusters and national and regional competitiveness, many countries are trying to strengthen existing clusters as well as to create new ones which may become future pillars of national competitiveness. Many companies in such cluster initiative are established companies each of which brings along existing customer and supplier relationships into the cluster. With this as a point of departure, we address the following issue: "How are the business networks of the cluster companies connected to the cluster initiative and the formalised interaction taking place therein?". Based on an investigation of one formalised cluster initiative, and the business networks of the partaking companies, we suggest six connecting modes through which companies in cluster initiatives may develop their respective business networks through interaction in the cluster initiative. The connecting modes are based on the concepts of unitary triads or serial tetrads, and the relationships being connected are either established relationships, potential relationships, or a mix thereof. We suggest that companies may develop their business networks through cluster initiatives by making use of one or several of these connecting modes. However, the extent to which companies will use these modes will depend mainly on whether the companies expect their existing business relationships to be enriched by, more than being endangered by, connections facilitated by the cluster initiative. When relationships are viewed as complex investments, it may be that the risk of creating negative connections which reduce the value of the relationships are emphasised more than the opportunity to create positive connections which could increase the value of the relationships.

Keywords: Connections, triads, tetrads, cluster, business relationships, business networks

INTRODUCTION

Inspired by research on clusters and national and regional competitiveness (e.g. Porter, 1998; Porter, 2000; Bresnahan, Gambardella and Saxenian, 2001), many countries attempt to strengthen existing clusters as well as to create new ones which may become future pillars of national competitiveness. In Norway, several public programmes have been initiated in order to strengthen established clusters and facilitate new cluster formation. One of these, the Norwegian Cluster Excellence Programme, has so far appointed and funds twelve clusters. This paper focuses on one of these, the NCI cluster. This cluster consists of ten companies, each characterised by being well-established and geographically located within the same region. Moreover, the cluster companies share a common interest in a particular technological field of expertise.

Traditionally, research on clusters focuses on issues such as how to strengthen certain technological capabilities within the cluster, how to brand the cluster, or make it well-known to the outside world, and how to strengthen the cooperation among the cluster companies (e.g. Porter, 2000). This paper takes on a novel approach by addressing whether the cluster companies utilise the cluster for strengthening their own business networks, i.e., the cluster is primarily seen as a means for network development. This approach directs attention towards the business networks of each of the cluster companies. In this way, this paper links clusters as an empirical phenomena to theory on business networks (e.g. Anderson, Håkansson and Johansson, 1994). More specifically, this paper directs attention to whether the cluster companies connect their business networks: learn across each others' relationships, 'borrow' counterparts from each other, cooperate in order to attract new counterparts, and conduct joint investments in common suppliers, etc. Addressing this issue is important, as it is within the business networks that each of the cluster companies carries out the majority of their business activities, generates their turnover, and spends their purchasing bills.

The paper is organised as follows. In section two, connections, triads and tetrads are introduced as ways of conceptualising connections between a cluster and the business networks of the companies partaking in the cluster. In section three, the method and the empirical material are presented. This is followed by the analysis in section four and the discussion in section five. Finally, conclusions and implications are presented in section six.

THEORETICAL BASIS

Conceptually, we may consider that the interaction formally facilitated by a cluster initiative is embedded in the wider business networks "when the interaction among the cluster companies affects, or is affected by, one or more relationships of the cluster companies". Thereby, we take our point of departure in the concept of "connections" when considering the cluster-facilitated interaction.

The concept of connection

In order to define what we mean by connection within the IMP, we usually borrow a definition from Social Exchange Theory (see for example Emerson, 1972 and Cook and Emerson, 1978). Emerson (1972 in Cook and Emerson 1984, p. 3) has defined the concept of connection in the following way: "Two exchange relations are connected to the extent that exchange in one relation is contingent, positively or negatively, upon exchange in the other relation". This implies that two relationships must affect each other to be connected. This view of the concept of connection is also used by Yamagishi, Gillmore and Cook (1988, p. 835), but in the latter article it is presented slightly different "...two exchange relations, A-B and B-C, are defined as connected at B to form the larger network structure, A-B-C, only when exchange between A and B to some extent affects exchange between B and C, and vice versa".

Furthermore, Emerson (1972 in Yamagishi, Gillmore and Cook 1988, p. 835) has elaborated on what is meant by positively and negatively connection. He defines these concepts in the following way: *"If two relations, A-B and B-C, are **positively** connected at B, exchanges in the A-B relation facilitate exchanges in the B-C relation and vice versa. If the same two relations are **negatively** connected at B, exchanges in the A-B relation diminish or prohibit exchanges in the B-C relations, and vice versa."* This implies that when relationships are positively connected at B, B e.g. exchanges something (resources, technical know-how, products etc.) to C which B has obtained from A, and which B either exchanges unchanged or further processed. When relationships are negatively connected at B, this often implies that A and C fight over something (resources, technical know-how, products) which is controlled by B.

The concept of connection within IMP

Within Social Exchange Theory, the relationships studied are, as mentioned above, between individual actors. Contrary to this, within IMP the focus is on relationships between collective actors such as organisations or firms. In the last decades, a few studies have been carried out within IMP focusing on the 'network context' of firms with special regard to how relationships are connected and thereby affect each other. These studies have shown that firms and relationships do not exist in isolation, but rather that they are connected to a network context through direct and indirect relationships (Laage-Hellman 1989; Blankenburg 1992; Anderson, Håkansson and Johanson 1994; Havila 1996; Pedersen 1996; Holmen and Pedersen 2000, Ritter 2000, Holmen and Pedersen, 2003).

In particular, Anderson, Håkansson and Johanson (1994, p. 4) discuss how to conceptualise business networks as sets of connected relationships. They define the 'network context' as *"The part of the network within the horizon that the actor considers relevant is the actor's network context"*. Thus, according to this view it is the focal firm which defines what is the useful context for a given relationship, depending on how the (focal) firm perceives its network horizon. The network horizon of a firm is defined by Anderson, Håkansson and

Johanson (1994, p. 4) as *"how extended an actor's view of the network is"*. Hence, a network horizon comprises those other firms and relationships of which a focal firm is aware - whether or not it considers them relevant. For a further discussion of network horizon see Holmen and Pedersen (2003). Anderson, Håkansson and Johanson (1994) identify a lot of possibly relevant actors, related either to the buying or selling firm, in the network context that may affect the focal dyadic relationship. Such actors and relationships are depicted in figure 1.

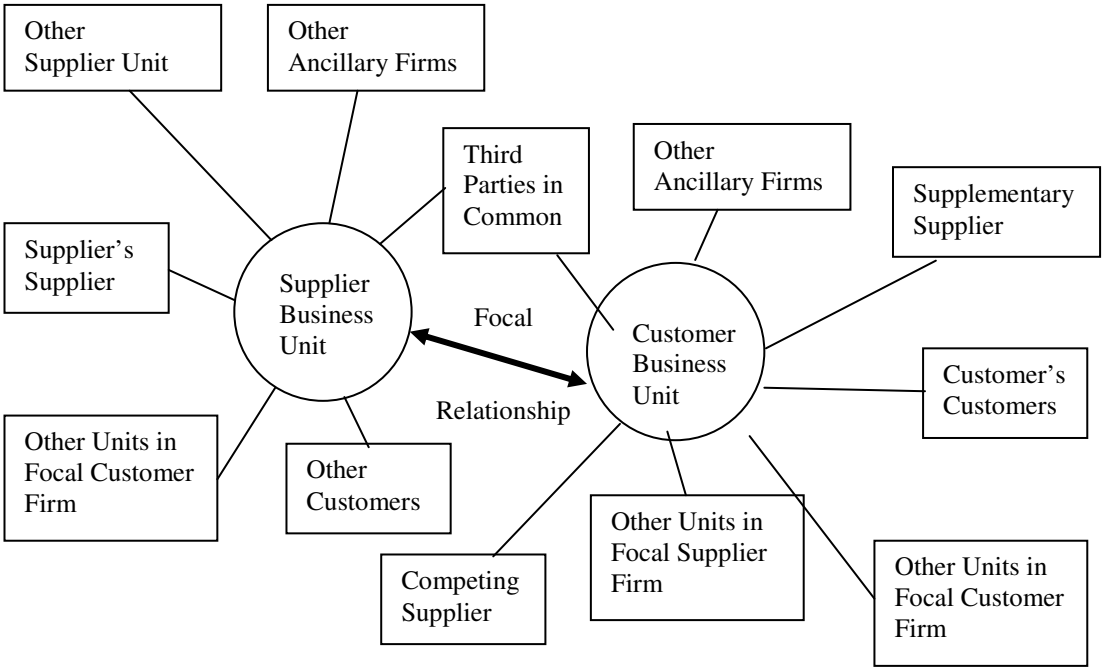


Figure 1: Connected relations for firms in a dyadic relationship (Anderson, Håkansson and Johanson 1994, p. 3)

Anderson, Håkansson and Johansson (1994) emphasise that within IMP, business networks are regarded as sets of connected relationships rather than sets of connected firms. Furthermore, dyadic relations are the focal unit of analysis when studying the concept of connection, which is also illustrated in the figure above (by the arrow). Furthermore, Anderson, Håkansson and Johanson (1994, p. 3) discern between the primary and secondary functions of relationships. *"By primary functions, we mean the positive and negative effects on the two partner firms of their interaction in a focal dyadic relationship. The secondary functions, also called network functions, capture the indirect positive and negative effects of a relationship because it is directly or indirectly connected to other relationships. However, in a given relationship, secondary functions can be as important as the primary ones, or even more so."*

Anderson, Håkansson and Johanson (1994) stress that connections between relationships may be either positive and/or negative and suggest two different sets of constructs for capturing such effects: Expected constructive effects and Expected deleterious effects. Furthermore, they emphasise that such effects may arise in different layers of relationships and in different magnitudes and combinations.

The concept of triads within IMP

Most of the studies within IMP which more or less explicitly focus on the concept of 'connection', have used the concept of *triad*. Cook and Emerson (1984) argue that a triad is the smallest unit of analysis which allows us to study connected relationships. Blankenburg

(1992) and Laage-Hellman (1989) in a similar vein claim that it is useful to study connected relationships within triads because of the possibility to delimit the phenomenon in different ways. *"The addition of a third actor represents a leap-wise increase in complexity which makes it possible, in a simplified way, to analyze connections and other network phenomena which cannot be handled in the received interaction model"* (Laage-Hellman 1989, p. 31). In the remainder of this section, we shall present some contributions focusing on the concept of triad. All these contributions focus on triads as small system with three actors and two or three connected relationships.

Laage-Hellman (1989) discusses connected relationships in his study of technological development in industrial networks. Laage-Hellman (1989, p. 31) introduces the concept of triad as a first step towards a network analysis: *"the key question is how the relationships in the triad affect each other, and how these connections affect the development of the individual interaction processes and the interplay within the triad and surrounding network."* Furthermore, he stresses that "… *connections within the triad may be strongly influenced by other direct relationships that the actors are involved in. …By implication, triad analysis should not be restricted by definition to the relationships between the three focal actors. How many actors and relationships should be considered when analysing a certain triad situation is an empirical question"* (Laage-Hellman 1989, p. 32). The triad concept is depicted in figure 2.

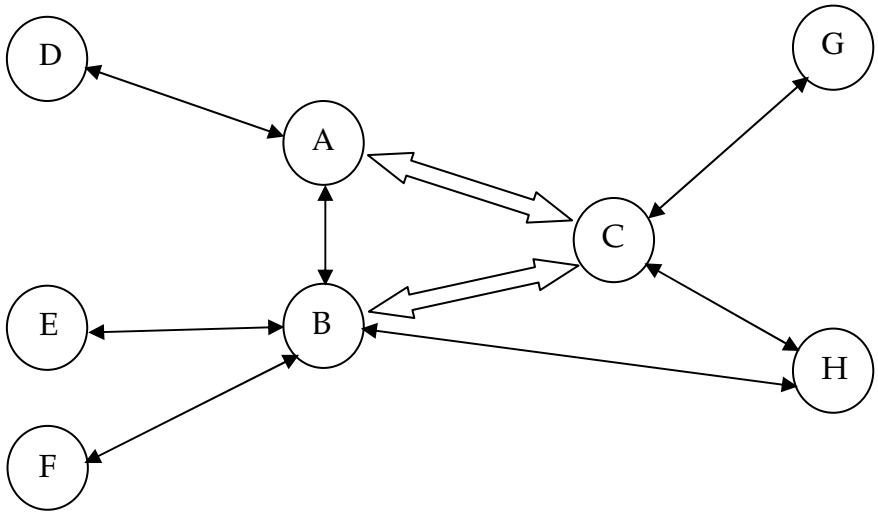


Figure 2: Schematic illustration of a triad situation (Laage-Hellman 1989, p.31)

Smith and Laage-Hellman (1992) propose a concept called 'small group analysis' based, among other things, on the thesis of Laage-Hellman (1989). In the article they use the concepts of activity-based connection and actor-based connection, mentioned above, but they also develop an analysis of transformation patterns focusing on how a focal actor can choose to transform its relationships. Smith and Laage-Hellman (1992) suggest five different transformation patterns: by-pass, combination, bridge, displacement and separation. In addition to this, they discuss methodological choices related to studying small groups and triads.

Blankenburg (1992) discusses the concept of 'connected relationships' in industrial networks. This author analyses 85 relationships between a Swedish producer/supplier and its customers in different European countries, and how these relationships are affected by 'potential

connections'. The main purpose of this study is to identify the existence of connected relationships. Furthermore, Blankenburg (1992) discusses different ways in which a focal relationship is affected by connections as well as different modes of managing connected relationships. The author uses a triad approach and identifies four types of connections: competitor, chain, internal, and ancillary. Furthermore, Blankenburg (1992) suggests four different modes of managing connections within a triad - dependent on what type of interaction and information exchange can be observed between the focal relation and the third party. These are depicted in figure 3:

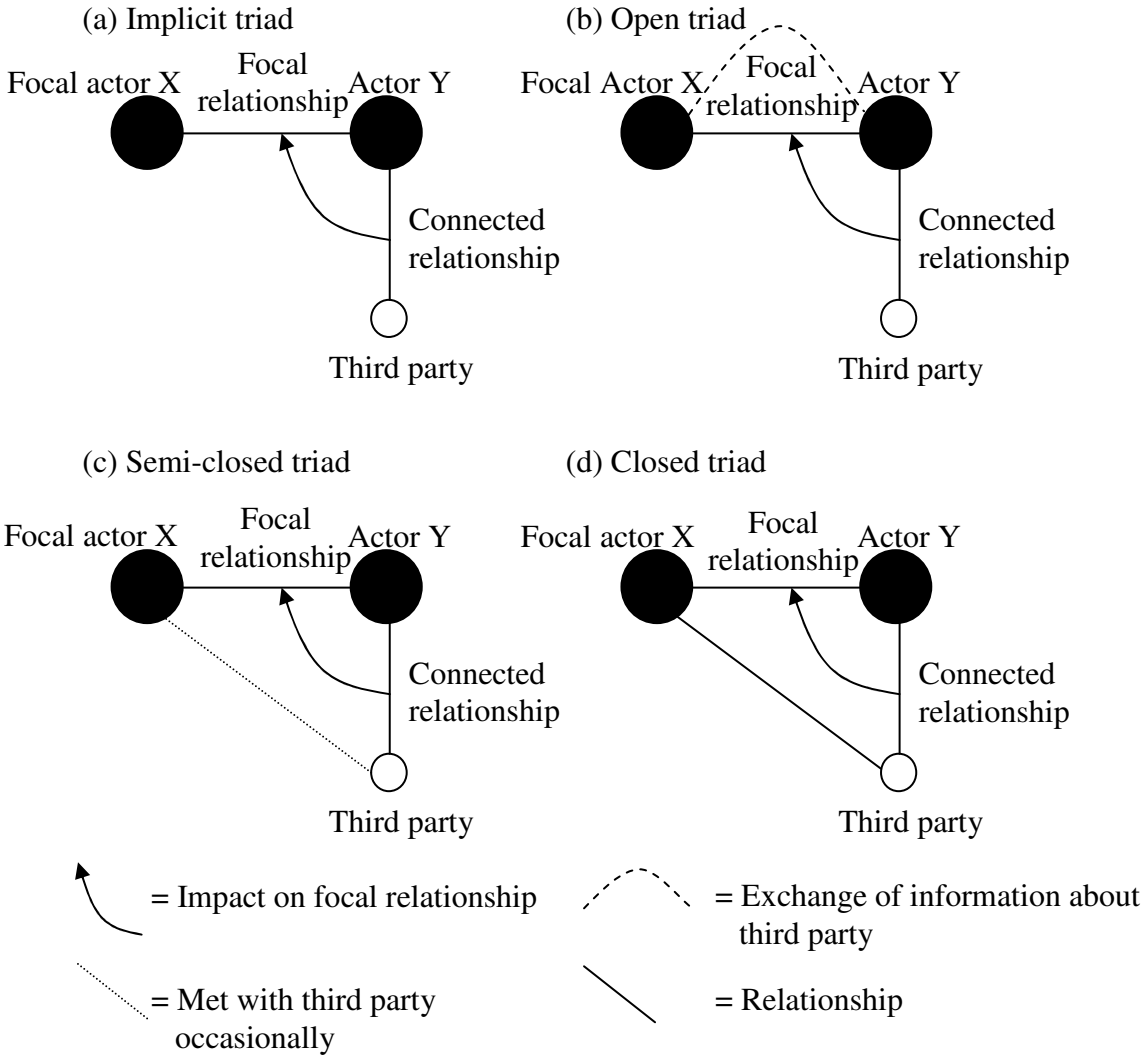
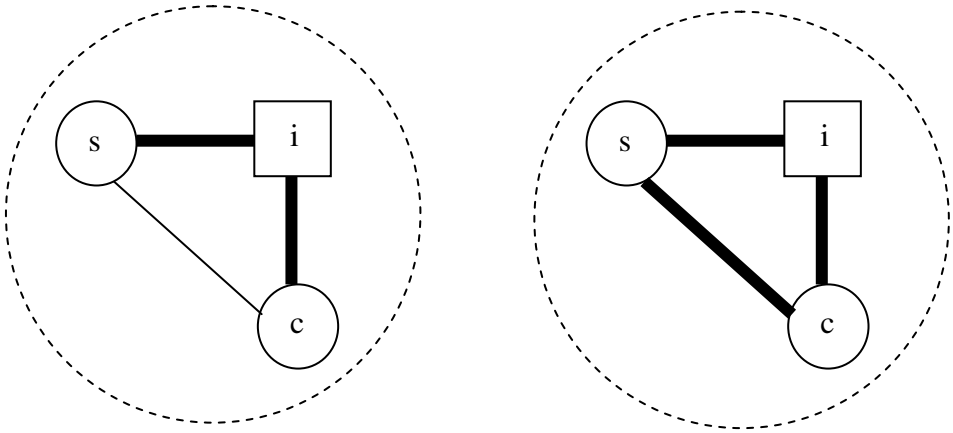


Figure 3: Modes of managing connected relationships (Adapted from Blankenburg 1992, p. 22)

Havila (1996) studies the changing role of intermediating actors in business- relationship triads, and moreover, how to conceptualise different business-relationship triads. Havila (1996) operates with two units of analysis: (1) the business-relationships triad, and (2) the role of the intermediating actor. Hence, *"the units of analysis are defined in a way which differ from the usual way of viewing business relationships: instead of seeing the relationship as a phenomenon joining two parties, the selling and the buying, one more party, the intermediating actor, is explicitly included"* (Havila 1996, p. 48). On the basis of this, the author distinguishes between two types of triads: serial triads and unitary triads. See figure 4:



a. Serial Triad b. Unitary Triad

s	= supplier
c	= customer
i	= intermediating actor
---	= focal business relationship (demarcation)
thick line	= much contact
thin line	= little contact

Figure 4: Two types of Triadic Business Relationships (Havila 1996, p. 27)

Pedersen (1996) studies the development of supplier relationships and how these relationships were affected by connected relationships. In her study, she analysed three focal relationships each involving a focal firm and one of its most important suppliers. Furthermore, she studied how the development of these relationships was affected by different connected relationships to the focal firm or to the three suppliers. On the basis of this Pedersen (1996) distinguished between effects of connected relationships in actor bonds, activity links and resource ties.

Ritter (2000) discusses interconnetedness of relationships and develops a framework for analysing connections in business networks. He assumes that the impact of relationship (x) on relationship (y) can either be neutral, positive or negative. Based on this he develops 10 different cases of interconnectedness in a triad, six serial triads and four unitary triads, and discusses the different effect.

The notion of *triads* has recently been addressed in research on supply network structure (Dubois and Fredriksson 2008; Choi and Wu 2009; Li and Choi 2009). Within this area of research there seems to be agreement (Choi and Wu 2009a; Choi and Wu 2009b; Dubois 2009) on the importance of studying triads. However, some differences exist as to whether the concept of triads is considered a sufficient point of departure for approaching the relevant part of the business network, or if additional requirements or concepts are necessary (Dubois 2009).

The concept of serial tetrads within IMP

As mentioned above, even if the concept of triad is indisputably of importance and definitely has merit for understanding part of the phenomenon of connections between relationships, it seems as if it is possible to question if additional concepts may be necessary to develop our understanding of connected relationships. Firstly, no actor can build up a relationship on its own since a relationship has two sides, and it requires mutuality. This is e.g. stressed by Håkansson and Snehota (1995, p. 20) arguing that *"Business relationships have the components of mutual orientation, commitment, adaptations, trust-building and social exchange over time. There is mutual interdependence of outcomes since they cannot be controlled unilaterally."* Hence, a business relationship is something qualitatively different from the two parties involved in it. Furthermore, as argued by Anderson, Håkansson and Johanson (1994) we need to take into account primary as well as secondary functions of business relationships. They characterise the primary function of business relationships as *"the interlinking of activities, creative leveraging of resource heterogeneity, and mutuality based on self-interest of actors"* (Anderson, Håkansson and Johansson 1994, p. 3). Secondary functions arise due to connections between relationships and "*concern chains of activities involving more that two firms, constellations of resources controlled by more than two firms, and shared network perceptions by more than two firms"* (Anderson, Håkansson and Johanson 1994, p. 3), The reason why it is important to take into account *both* functions of a relationship is that the stance taken by each of the parties, respectively, involved in a dyadic relationship, towards the particular relationship, will depend on how they perceive the primary and secondary functions of the relationship. And, as pointed out by Anderson, Håkansson and Johanson (1994, p. 13) *"…because we regard business networks as sets of connected business relationships rather than as sets of connected firms, secondary functions of relationships should be of prominent interest for analysis…."* Hence, since a relationship has two sides, the secondary functions for ***each*** of the two parties seem important to analyse.

In a serial triad, as discussed earlier, the focus is on one 'actor connector function', see for example Rosenbröijer (1998). We will argue that we sometimes need both sides of the relationship. Naturally, this may be studied by means of a unitary triad, in which it is possible to study more than one 'actor connector function'. However, as pointed out by Anderson, Håkansson and Johanson (1994) their conceptualisation of 'network context' differs from the one usually employed in Social Exchange Theory. They argue that "*Our conceptualization for a business context departs from Thibaut and Kelley's (1959) social context for at least two reasons. First, Thibaut and Kelley consider only groups, so that, by definition, the actors are completely interconnected. By contrast, within a business network context, some actors germane to each member of a focal dyad will not be directly connected to the other member. Thus, CL and CL_{ALT}[1] for the group have more cohesive meanings that for a business network context. Second, in the Thibaut and Kelley analysis, which largely focuses on triads of friends, an actor simply changes group when exercising CL_{ALT} for the group. It would be much more difficult, if not impossible, for a focal firm to move to a new network context, which has a completely different set of connected business relationships."* (Anderson, Håkansson and Johanson 1994, p. 9). This considerations are also related to Granovetter's (1985, p. 1363) discussion of 'the forbidden triad', according to which all serial triads with two strong relationships are (or will eventually become) unitary triads. By implication, he regards serial triads are temporary phenomena.

[1] Detailed description and discussion of the CL and CL_{ALT} concepts proposed by Anderson, Håkansson and Johanson (1994) is beyond the purpose of this paper. The reader is referred to their article (1994, p. 9-12).

However, according to the above-mentioned proposition by Anderson, Håkansson and Johanson (1994), it seems as if 'the forbidden triad' is less forbidden in industrial networks. Therefore, as opposed to the unitary triad, which may be likened to a group, it may be of more interest to study two 'actor connector functions', without restricting these to be identified within a unitary triad. We need two 'actor connector functions', because the development of relationships will depend on how both parties succeed in creating beneficial secondary functions of a focal relationship. However, these two 'actor connector functions' may be of interest to study in a contexts where two parties involved in a relationship are connected to respective counterparts without these turning into cohesive groups.

Therefore, on the basis of the preceding discussion, we find it useful to consider the concept of *serial tetrads*, which was introduced in Holmen and Pedersen (2000). "*A tetrad is a system of four entities – in our case, four actors. Furthermore, it contains three relationships. A tetrad can be said to be the smallest unit of analysis in which it is possible to study two overlapping triads in which the third parties of the focal relationship differ"* (Holmen and Pedersen, 2000, p. 14). Thereby two actor connector functions, which do not pertain to the same 'group', can be identified. Hence, two inter-related sets of primary and secondary functions which influence the 'jointly' developed relationship may be studied. Furthermore, a serial tetrad is the smallest unit of analysis which allows for enquiry into what Holmen and Pedersen (2000) call a *'relationship connector function'***,** i.e. how relationships as substantial 'quasi-organisations' work to connect different (at minimum two) third parties of the actors involved in the focal relationship. The concept of 'serial tetrad' is depicted in figure 5:

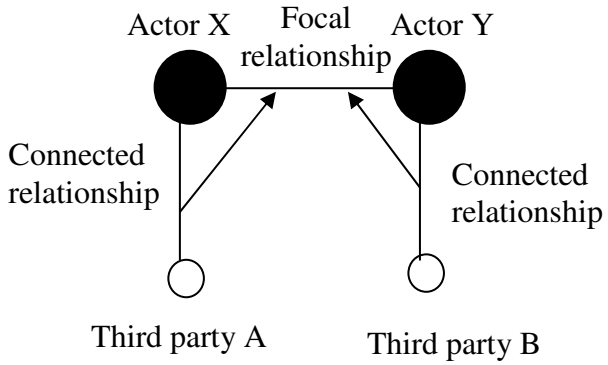


Figure 5: A serial tetrad (Holmen and Pedersen, 2000, p.10).

In summary, positive and/or negative connections between relationships may be considered in triadic or in tetradic settings.

METHODOLOGY AND EMPIRICAL BASIS

The empirical material consists of a case study of the cluster NCI and the business networks of its ten cluster companies. Typically, the case study method is regarded as advantageous when the phenomenon studied is complex and difficult to separate from its environment (Yin, 1989). This is certainly the situation for this study, as business networks by nature are difficult to delimit, making case study an appropriate method (Halinen and Törnroos, 2005). Although this study includes ten business networks, these are connected through NCI, making it an embedded, single case study (cf. Yin, 1989).

The empirical material was collected over a time period of two years: from January 2007 to December 2008. In total, 19 face-to-face interviews were conducted with representatives from nine of the ten cluster companies of the NCI. The tenth, Juliet, was not interviewed, among other things because it is a very large and complex company that acts as a customer for many of the other cluster companies, however coordinated by different divisions located in many different places. For eight of these companies, two interviews were conducted, while three interviews were conducted for the ninth company. The interviews followed a semi-structured interview guide that focused on the following main themes: (1) information about the interviewee, the cluster company, its main products, and history, (2) customers, e.g. with a particular focus on central characteristics of the relationships to the most important counterparts, connections to other NCI companies, (3) suppliers, e.g. with a particular focus on central characteristics of the relationships held with the most important counterparts, connections to other NCI companies, (4) other cooperative partners, and (5) characteristics of business relationships with other NCI companies. In most cases, the interviews focused on the 5-10 counterparts regarded by the company to be the most important ones within each of the three categories 'customer', 'supplier', and 'other cooperative partners'.

The representatives from the nine cluster companies include the management level: CEO, marketing manager, production manager, purchasing manager, the technical manager, or senior technical personnel. When setting up the interviews, a main purpose was to cover both the customer and the supplier side of each company. Therefore, initial contact was typically made with the respective cluster companies' contact person for the NCI program. This person, often the CEO, then indentified two representatives that seemed to fit the purpose of this project. These two representatives would then receive some information about the project, hereunder the interview guide. Furthermore, at this moment of time, the representative was made aware that the prospective interview would be transcribed and sent to the interviewee for approval; corrections/removal of information. Following this, the interview was conducted. Each interview lasted about two hours. Notes were taken during the interview. No tape recorder was used. The interviews were all-importantly conducted by a team of three researchers. For 16 of the 19 interviews, two interviewers participated, whereas the other three were conducted by one interviewer. Through involving more than one interviewer for the majority of the interviews, the team of three were able to more effectively learn from each other and follow up on aspects from other interviews, among other things. Following each interview, it was transcribed and discussed by the participating interviewers before it was sent to the interviewee for further comments, corrections, and potential removal of sensitive information. In addition to the interviews, secondary information about each of the nine cluster companies was gathered, both prior to, and subsequent to, the interview. This included annual reports, company information and product information. The homepage of the ten companies, as well as the homepage of the NCI initiative, was consulted frequently, and newsletters of the NCI consulted.

NCI consists of ten cluster companies that share a main field of technology. NCI is one of twelve clusters that have been appointed in Norway. They are financed by the Norwegian government through a ten-year program, and comprise clusters that are regarded as world-class within their fields, including micro- and nanotechnology, cancer research, maritime technology, culinology, and energy and emissions trading, among others. The NCI we have studied was formally established in 2006, and the ten cluster companies operate within a wide area of business sectors.

Nine of the ten companies employ from 100 to 400 employees. The tenth, Juliet, employs more than 30,000 and is among the 50 largest companies in the world with respect to market value. All of the companies can be referred to as technology-intensive, and engineers constitute a high number of their employees. The nine companies are located in the same area, whereas for Juliet, a research centre with more than 500 employees is located there. A majority of the ten companies were founded in the 1980s, making them around 30 years, whereas Foxtrot and India were established in respectively 1995 and 2000. Juliet was established in 1972, and the research centre was established in the 1980s. Several of the ten were established as independent companies, however, they have at a later stage been bought up. Alpha, Bravo and India have all been bought up by international companies, and operate as subsidiaries or as business units within a larger corporation. Another three have been bought up by national companies. Hotel was bought up by a national company located elsewhere in Norway, and Delta and Charlie were both bought up by the Kilo Group, however as two individual business transactions.

Many of the ten NCI companies operate within the maritime, offshore, and oil and gas industries. Their products and solutions are typically focused towards what can be referred to as technological niches, and some are, despite their relatively small size, global market leaders. For six of the companies, Bravo, Charlie, Delta, Golf, Hotel, and India, the export share can be as high as 90%. For Alpha, this number is reported to be around 35%. The domestic market for its products is quite high due to a large maritime sector. Foxtrot and Echo even to a larger extent serves domestic customers. For Juliet, the Norwegian continental shelf represents its main base, however, the company has grown internationally, and now has operations in more than 40 countries. Juliet plays a particular role in NCI, being a customer for six of the other nine cluster companies. The role as a customer involves the whole Juliet company, and not just the research centre. None of the ten NCI cluster companies are head-to-head competitors. To a limited extent, some competition may take place as technical solutions from one of the NCI companies may strengthen or weaken the opportunities for sales from another NCI company. However, these effects are rather rare, and do not permeate the atmosphere of NCI. On the technological side, there are several similarities within NCI. Most importantly, the companies share a field of technology, including sensor, instrument, measuring technology, automation solutions, and communications solutions. Within NCI, four focal areas have been identified: standardization, technology, industrialization, and market development. Since the establishment of NCI in 2006, the cluster companies have conducted a number of projects within each of these focal areas. In addition, NCI focuses on branding of the cluster itself, cooperation in relation to research and the development of study programs at universities and colleges, and seminars.

For NCI, we have observed 20 active business relationships among the 10 cluster companies. Six of the cluster companies hold a relationship to Juliet as a customer. Respectively four and eight of the cluster companies make use of Foxtrot and Echo as their supplier. The remaining seven hold between three and five business relationships with other cluster companies, some of which are customer-supplier relationships, whereas others are regarded as horizontal, i.e., the parties cooperate without either of them holding clear roles as customer or supplier. The companies regard the majority of these relationships as small/limited. When it comes to the customer-side, the cluster companies have very few in common outside of the NCI cluster. Combined, the nine cluster companies mention more than 80 counterparts which they regard as important. Of these, only two customers are mentioned by more than one company, and more specifically each of these two are mentioned as important customers by two cluster companies. Reasons for this may be that most cluster companies sell their products

internationally, they are not head-to-head competitors, and their products typically target niches or system integrators. On the supplier-side, however, things look a little different. One supplier is mentioned as important by five cluster companies, and some of these even mention it as the most important supplier. Another is mentioned by four, and seven companies are mentioned as important suppliers by three cluster companies. Two companies are mentioned as important suppliers by two cluster companies. All these suppliers are Norwegian, and a majority is located in the same region as the NCI cluster. Reasons for this can be that most cluster companies sell products that are quite compound, and make use of local, specialized suppliers within fields such as metals, plastics, electronics, printed-circuit boards, certifications, and design.

ANALYSIS

Drawing on the concepts of triads and tetrads along with the empirical material, we propose two sets of connecting modes through which the business network of the cluster companies are "brought into" the cluster and the organised interaction therein. Each set contains three modes, creating a total of six different connection modes. See Table 1.

Table 1. Six different connection modes

Type 1:	**Connecting with a common counterpart in a triad**	**Type 2:**	**Connecting with two different counterparts in a tetrad**
Mode 1A:	Connecting two established relationships in a Triad	Mode 2A:	Connecting two established relationships in a tetrad
Mode 1B	Connecting one established and the starting up of one potential relationship in a potential triad	Mode 2B:	Connecting one established and the starting up of one potential relationship in a potential tetrad
Mode 1C:	Connecting the starting up of two potential relationships in a potential triad	Mode 2C:	Connecting the starting up of two potential relationships in a potential tetrad

Type 1 concerns two cluster companies connecting their established or potential relationships with a common third party, i.e. a unitary triad. More specifically, Mode 1A refers to situations where two cluster companies hold established relationships with a common counterpart. Mode 1B refers to situations where one cluster company holds an established relationship with a potentially common counterpart, and the other not. Mode 1C refers to situations where none of the two cluster companies hold established relationships with the potentially common counterpart. Type 2 concerns two cluster companies connecting their established or potential relationships with two different third parties, i.e. a serial tetrad. Mode 2A refers to situations where the two cluster companies each hold an established relationship with the two different counterparts. Mode 2B refers to situations where one of the two cluster companies hold an existing relationship to one of the two third parties, whereas the other cluster company does not hold an existing relationship to the other third party. Finally, Mode 2C refers to situations where none of the two cluster companies hold established relationships with the two different third parties.

In figure 6, the bold nodes represent cluster companies, and the dotted lines denote formal interaction between the cluster companies. The non-bolded nodes represent third parties in the business networks of the cluster companies. Bolded lines represent established relationships to the third party, while non-bolded lines denote potential relationships which may be started up.

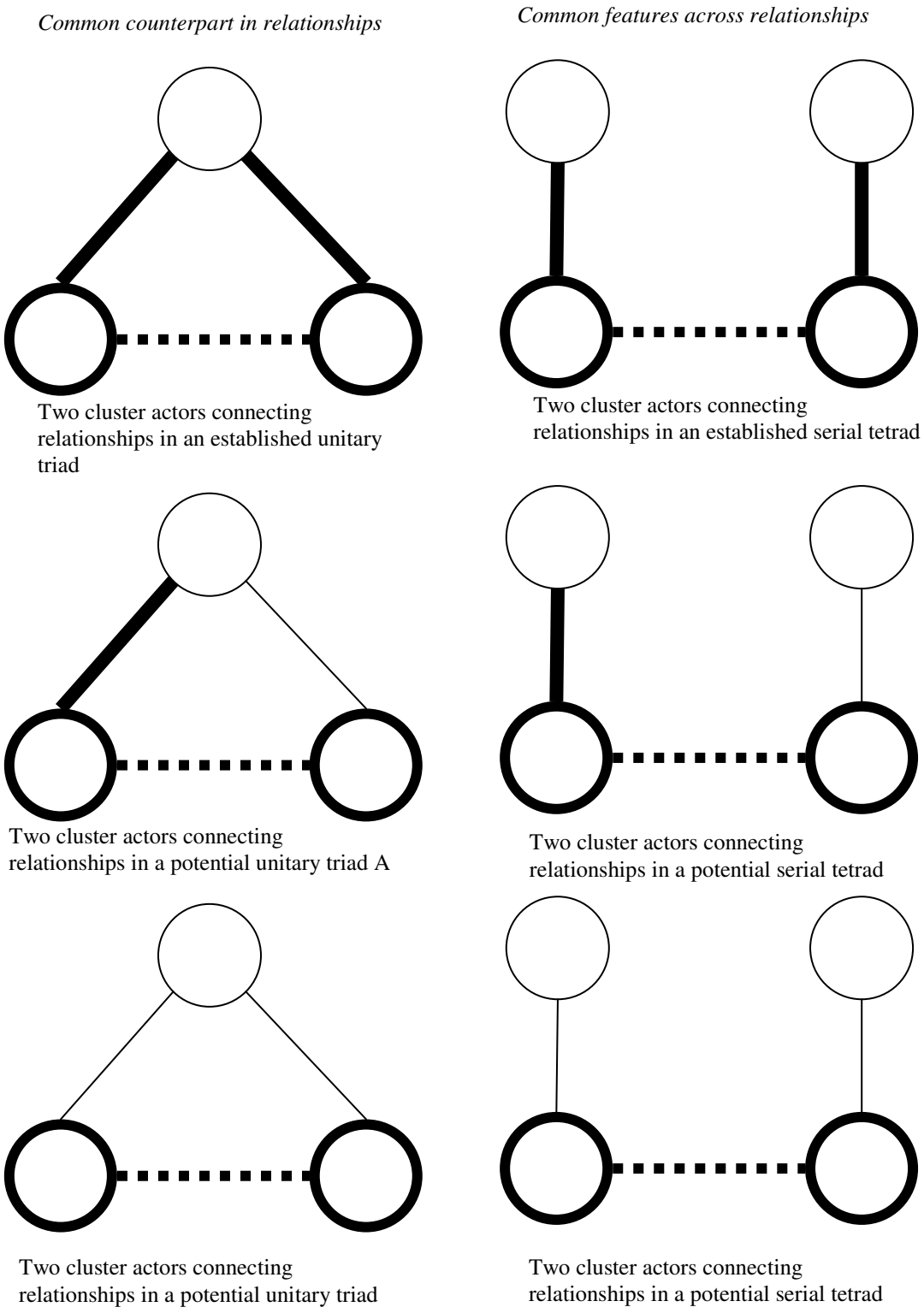


Figure 6: Depicting the six connecting modes

The first three modes focus on connecting relationships to (potentially) "*common customers or suppliers"*. The last three modes focus on connecting relationships which have *"common features across different counterparts"*. Hence, both modes focus on creating connections across different companies' relationship portfolios. Each of the six connection modes provides distinctly different ways in which a cluster company may utilise the cluster for the development of its business network. The analysis is organised by use of these six connection modes.

Connecting with a common counterpart in a triad (Type 1)

Connecting relationships to common customers, suppliers or other collaboration partners
The cluster companies have few ***customers*** in common. There is, however, one company which most of the cluster companies have established relationships to – a large oil and gas company, OilGroup. The cluster companies stress the difficulties with keeping overview of the OilGroup organisation due to its size and the relatively frequent re-organisations taking place. Thereby, the cluster companies might interact on key contact persons, and information on who is in charge of which budgets, who are the key decision makers etc. Interaction between the cluster companies on joint technology development with OilGroup is also relevant since many of the cluster companies emphasise the importance of OilGroup as a premise provider. When one of the cluster companies get insight into new info on key contact persons, this information may be shared with another cluster company.

There are some similarities among the cluster companies' individual relationships to OilGroup; however, there are also many differences since each of the cluster companies relate to OilGroup in quite particular ways. For example, even if all the cluster companies are small business units of a size which makes it impossible to enter into a frame agreement/contract with OilGroup, most of the cluster companies from part of larger national or international corporations some of which have frame agreements with OilGroup. Nevertheless, there are many differences between the corporations to which the cluster companies belong; and the relationships which the corporations have to the system integrations firms, which have the main responsibilities for deliveries to OilGroup, differ widely. Hence, it seems that there are issues on which the cluster companies may interact to widen their understanding of "the many faces of, and different routes into, OilGroup".

Overall, most of the cluster companies who have OilGroup as a direct and/or an indirect customer are aware that OilGroup is also a customer of some of the other cluster companies. Furthermore, most of the cluster companies have a little insight into some elements of OilGroup's relationships to the other cluster companies. However, few of the cluster companies have insight into the specifics of the other cluster companies' relationships to OilGroup. In addition, it does not seem as if the cluster companies aim to explicitly coordinate their respective relationships to OilGroup, through the cluster initiative. While there is some informal dialogue among different cluster companies in relation to OilGroup, we have not identified any examples of explicit coordination among the cluster companies. In addition, the cluster companies do not seem to consider it is a viable opportunity to jointly connect their relationships to OilGroup. Rather, they seem to refrain from doing this and stress the dangers of undertaking explicit attempts at organising interaction on joint customers of the cluster companies. "All of us have gained insight into and information related to OilGroup through our individual relationships to OilGroup. However, we are not sure which pieces of this information is acceptable for OilGroup that we exchange with other parties, and which pieces of information OilGroup does not view as acceptable that we share with others."

The companies in the cluster have several common ***suppliers***, both local as well as national ones. One example of a local one is RadioElectronicsGroup. For many of the cluster companies, RadioElectronicsGroup is the largest or among the largest suppliers. Some use RadioElectronicsGroup as "single source" or "first source", others consider using RadioElectronicsGroup as "second source". Many of the companies have a long-term relationship to RadioElectronicsGroup, for a few it is a rather recent relationship. The cluster companies buy somewhat different products and services from RadioElectronicsGroup, e.g. production and mounting of circuit boards, systems supply of complete products with encapsulated circuit boards, radio controls and transmitters, product development services, prototyping services, testing and lab-services. In line with this, the cluster companies make use of different facilities at RadioElectronicsGroup, among others the production lines for circuit boards, the temperature and vibration lab, the explosion casting equipment, and the radio testing equipment. The cluster companies pay attention to different capabilities of RadioElectronicsGroup, e.g. few defects, ability to handle complex electronics production, ability to discuss design for manufacture, sensitivity towards customer needs and requirements, and good overview of obsolete components. Some cluster companies stress financial stability, low employee turnover, large flexibility, in-depth insight into the customers' working routines, and good network of collaboration partners. Some cluster companies buy the components which RadioElectronicsGroup uses in their production, others leave it up to RadioElectronicsGroup to handle the purchasing of components. Some of the cluster companies actively try to influence RadioElectronicsGroup to get ISO certification, others work actively on improving RadioElectronicsGroup's capabilities related to Design for Manufacture and Early supplier involvement in product development. Yet others have worked with RadioElectronicsGroup to increase industrialisation and reduce the number of manual operations. Some focuses on improving testing capabilities, in particular Environmental Stress Screening (ESS). Finally, some cluster companies find the delivery times satisfactory, but many experience quite long delivery times, and therefore they encourage RadioElectronicsGroup to improve their overview of processes at, and delivery times from, sub-suppliers and, furthermore, build up stock for critical components with long delivery times.

There are many similarities among the cluster companies' individual relationships to RadioElectronicsGroup; however, there are even more differences since each of the cluster companies make use of RadioElectronicsGroup's products, services, facilities and capabilities in very different combinations. Hence, there are many issues on which the cluster companies may interact. Overall, most of the cluster companies who use RadioElectronicsGroup as a supplier are aware that RadioElectronicsGroup is also a supplier to some of the other cluster companies. Furthermore, most of the cluster companies have some insight into the more conspicuous elements of RadioElectronicsGroup's relationships to the other cluster companies. However, few of the cluster companies have insight into the specifics of the other cluster companies' relationships to RadioElectronicsGroup. There is some informal dialogue among the cluster companies, in particular, some of them have touched upon the possibility of coordinated supplier development efforts towards RadioElectronicsGroup, both in terms encouraging an expansion of the production volume as well as improving routines for early involvement in product development. Nevertheless, we have only identified one concrete example of coordination among the cluster companies. This example refers to an occasion when one cluster company had placed an order for a subassembly at RadioElectronicsGroup, and where quick delivery was very critical for the cluster company. The cluster company discussed the delivery time with RadioElectronicsGroup, who informed them that the order

was in a queue, awaiting production of the orders placed by other companies. RadioElectronicsGroup did not know how critical the orders were for these customers, but they did inform the cluster company that one of the other cluster companies were among those who were "higher up in the production queue". And, if the cluster company would contact the other cluster company and successfully persuade the other cluster company to "switch places in the queue", RadioElectronicsGroup could delivery the order quicker. The cluster company did contact the other cluster company who gave permission to switch places in the queue.

Overall, it does not seem as if the cluster companies aim to explicitly coordinate their relationships to RadioElectronicsGroup, through the cluster initiative. The cluster companies seem to use this approach towards all their common suppliers (of which there are quite few). While some cluster companies are aware that they have suppliers in common with other cluster companies, they seem to spend little time on considering opportunities for joint coordination towards these suppliers.

Connecting one established and one potential relationship in a potential triad (Mode 1B)
Some of the cluster companies attempt to benefit from the established ***customer*** relationships of other cluster companies. As one example, one of the cluster companies has established customer relationships to a couple of companies within development and installation of offshore wind mills. As energy production through the use of onshore and offshore wind mill installations is viewed as a large market opportunity, some of the other cluster companies want to establish relationships with these companies. While it is not clear what particular products the other cluster companies would deliver to them, they would like to start up a dialogue on this. Therefore, there is some interaction among the cluster companies concerning these potential customers. The former cluster company is used as a beachhead by the other cluster companies. However, introducing the NCI cluster companies as a group of companies some of which may become suppliers to the windmill companies, is done in a manner which is relatively "free from obligation" both for the cluster company and for the company which may become a customer for some of the other cluster companies. One of the cluster companies has a long established relationship to a large public agency focusing on traffic solutions. Improved traffic conditions through the use of novel, intelligent traffic solutions (ITS) is viewed as a future market opportunity, and some of the other cluster companies are interested in a dialogue with this public agency. While it is not clear what particular products the other cluster companies would deliver to the agency, they would like to start up a dialogue to identify joint possibilities. Therefore, a seminar was held on the topic of ITS, where a representatives of the public agency and another company exchanged ideas with the cluster companies. Also in this situation, the former cluster company is being used as a beachhead by the other cluster companies, and introducing the other cluster companies to the agency is also here done in a manner which is relatively "free from obligation" both for the cluster company and for the agency which may become a customer for some of the other cluster companies.

In a similar vein, some of the cluster companies already "have good and established cooperation" with a ***research centre*** within the field of measurement. Some of the cluster companies believe that there may be a "large potential for collaboration on joint areas of interest", e.g. oil and gas, environmental scanning, and the fishing and fish farming industries. Therefore, a seminar was held where "mutual briefing about ongoing and planned activities was on the agenda". On this occasion, several cluster companies acted as beachheads for the possible establishing of relationship between the research centre and other cluster companies.

One of the cluster companies has established a ***supplier*** relationship to a company offering particular testing services for particular types of products which need testing for working in very demanding contexts of use. The cluster company, however, wants this supplier to establish itself in the region with a range of testing facilities, which would lead to better testing logistics for its customers in this particular region. Therefore, the cluster company has informed the other cluster companies about the existence of this testing supplier and, furthermore, informs the others "when the supplier is in town".

Furthermore, some cluster companies express that one of the main reasons for joining the cluster is that the other cluster companies can "act as door openers to new markets" and "we hope to achieve market breakthroughs by ….using the existing channels in the cluster".

Connecting the starting up of two potential relationships in a potential unitary triad (Mode 1C)
The "NCI cluster of companies" was contacted by a foreign company AutoAirGroup which were searching for Norwegian suppliers and wanted to find out which types of products and services the NCI cluster could supply. Therefore, a seminar was arranged between AutoAirGroup and the NCI companies where the purpose was to present the cluster companies and their offerings, as well as to present AutoAirGroup and their needs. The presentations were quite separate and aimed to provide insight into whether individual relationships could be started up between AutoAirGroup and the respective cluster companies.

Connecting with two different counterparts in a tetrad (Type 2)

Connecting two established relationships in a tetrad (Mode 2A)
This connection mode concerns exchanging experiences and practices across relationships to different counterparts. There are several situations where one cluster company has gained experiences with some of its counterparts which bear similarities to experiences which other cluster companies have gained with their counterparts, although these counterparts are different ones. One of these concerns the starting up of relationships to public customers. One of the cluster companies has been very successful in establishing, and maintaining, relationships to a key set of customers who operate in the public sector and which, consequently, have to follow requirements for public tenders. Another cluster company also have public sector customers, and while it has been able to establish more continuous relationships to some such customers, it has so far established little systematic learning and "rules of thumb" for how one may successfully initiate and maintain relationships to such customers. Therefore, this company would like to enter into a dialogue with the formerly mentioned cluster company in order to try to find some key insights into this managerial issue, based on their respective experiences with different public sector customers operating in very different sectors.

Another situation concerns industrialisation, and emerged through a seminar series that was established held on this kind of topic among the cluster companies. At one of these seminars, a supplier to three of the cluster companies gave a presentation on this issue, concerning a particular material, production processes for this material, and issues of relevance when designing products in this material. While the dialogue at the seminar could lead to other additional cluster companies starting to use this particular supplier (in which case the example would be placed in Mode 1B), the underlying idea seems to have been to transfer knowledge on "working with suppliers and taking into account industrialisation issues" which could

inspire the cluster companies to apply a similar logic, or working method, towards their existing suppliers.

Yet another situation concerns the purchasing function of the cluster companies. Most of these companies are relatively small, and few have a professional and dedicated purchasing and supply management function. Whereas a majority of the cluster companies view themselves as competent in making technical specifications, they experience difficulties related to the more commercial aspects of purchasing as well as supplier involvement in product development. In particular one company has called for a need to develop and transfer competence on purchasing and supply management across the cluster companies.

Connecting one established and one potential relationship in a potential tetrad (Mode 2B)
As an example of this, two of the cluster companies use a particular industrial design firm for particular types of design and development assignments, and in order to inspire the other cluster companies to start using suppliers of such services in their product development efforts, a seminar was held with guest participation of the supplier used by two cluster companies.

Two actors connecting two potential relationships in a potential tetrad (Mode 2C)
Some of the cluster companies have expressed an interest in internationalisation, on the markets side as well as on the supply side. Among others, China and South-East Asia are presently viewed as interesting. In line with these common interests, a meeting was held with the leader of a public agency's representation in New Delhi. The agenda for the meeting was to inform the cluster companies of business opportunities in South-East Asia within the fields of the maritime, the oil and gas, and the energy sectors. Thereby, the cluster companies could consider, in parallel, how to establish relationships to new suppliers or customers in this area, although the actors of interest to the different cluster companies most likely would be different ones.

DISCUSSION

The six modes for connecting the cluster initiative to the wider business networks are being used by the cluster companies, which indicates that the participating cluster companies seek to make use of each others' business networks. However, most of the modes are only used on one or a few occasions. There may be several reasons for refraining from extensive, formalised cluster-network connecting actions. Below, we shall address some of the factors which may explain the relatively few attempts at connecting the business networks of the cluster companies through formalised interaction in the cluster initiative.

The cluster

One reason may be the nature of this cluster, which is somewhat atypical. Typically, a cluster involves a high degree of buying-selling activities among the cluster companies. I.e., some of the companies in the cluster have others in the cluster as their biggest customer or supplier. In the NCI cluster, the degree of buying-selling activities among the cluster companies is low. Rather than being each others' suppliers and customers, these cluster companies are united by a field of technology. Therefore, this cluster does not cover several tiers of a supply chain. Moreover, a majority of the cluster companies develop highly specialised products that are sold in internationally in what can be referred to as niche markets. As the cluster companies operate in different niche markets, there is very little direct competition among them, however, also a low degree of contact on a daily basis.

Another reason for the overall pattern of few connecting actions may be due to the fact that this cluster initiative has only been in operation for a couple of years. Taking into consideration that there was little activity among the cluster companies prior to this formal appointment of NCI as a cluster, and the fact that development of business relationships takes considerable time, this can in part explain the low degree of activity among the cluster companies. If more substance among the cluster companies would be developed, and lack of substance is the main reason for refraining from extensive connecting of the business networks to the cluster initiative, the present pattern may change, and the cluster and the business networks will coalesce. However, another explanation may be that the connecting behaviour we have observed is independent of the (lack of) substance of the relationships among the cluster companies. Hence, companies may refrain from formally and extensively connecting their common counterparts, or relationships with common features to different counterparts, irrespectively of the substance of the relationships among the cluster companies being low or high.

A third reason for the cluster companies seeking to utilise each others' business networks may relate to the extent of the cluster initiative. So far, this initiative typically includes 2-3 key personnel from each of the cluster companies, spending parts of their time on activities related to the cluster. Most of the activities among the cluster companies are organised as projects. Sometimes, these projects include the key persons, and in other cases, the key personnel involve other personnel from their companies. Hence, the complexity of the relational interfaces across the cluster companies is quite low, due to a low number of representatives and functions interacting across the boundaries of the cluster companies.For each of the cluster companies, therefore, the majority of their external activity is spent on their day-to-day operations; buying, selling and cooperating within their respective business networks. Hence, the cluster intiative becomes an appendage to the main business of the companies. The number of buyer-supplier relationships (or substantial relationships in general) among the cluster companies is relatively small and the relationships are relatively weak. It may be that the development of stronger relationships between the cluster companies is a necessary first step for subsequent connecting of the cluster to the wider networks of the respective cluster companies. Since close and substantial business relationships have not been established yet, it may be too early to identify substantial connecting of the business networks and the cluster initiative.

The six connecting modes

We may also ask why there are so relatively few examples of type 2A attempts at coordination in relation to common counterparts. Such behaviour may be explained by looking at relationships as valuable resources, or investments in unique and complex interactive structures with idiosyncratic dynamics. It seems as if the cluster companies are guarding their relationship investments. In theory, attempts at connecting two relationships may result in positive and/or negative connections across the relationships (or have zero effects) and such connections across relationships can be numerous and concern many different dimensions or layers. In this line of reasoning, connections are multidimensional, continuous variables. Furthermore, a positive connection at one point in time may turn into a negative one at another point in time, or when viewed in another context or for another purpose, implying that the variables are instable. Furthermore, connections may be connected; that is, an action that creates a positive connection in one dimension may simultaneously create another positive connection, or a negative connection, in another dimension.

If two cluster companies would be able to establish many positive connections between their relationship to a common customer or supplier, the value of the relationship investments would increase. However, if two cluster companies would (also) come to create a number of negative connections between their relationships to a common customer or supplier, the value of one or both of the relationship investments would decrease. Therefore, if the cluster companies assess it as likely that their joint attempts at coordinating their common relationships will result in many negative connections, they may refrain from attempts at creating such connections. The likelihood that negative connections may be created can be related to: the complexity of relationships, the limited network horizon and hence limited awareness and insight into the network, and the difficulty of predicting non-linear effects from interaction (i.e. surprises). It can be difficult for another company to overview and understand the complexity of a relationship between two other parties; it may even be difficult to overview and understand a relationship even if you are one of the people directly involved in it. Consequently, it is easy to make wrong assumptions and assessments in relation to a relationship between others, and the dynamics in it and how they may be affected by attempts at making connections. Furthermore, a common counterpart will usually have more counterparts than the subset of counterparts actively coordinating their respective relationships. In our case, not only cluster companies are counterparts of the joint suppliers or customers. Hence, due to the complexity and investment value of relationships, and the limited network horizon, (cluster) companies may be wary of actively connecting their relationships to a common counterpart. In addition, if companies should spend time on connecting their relationships to a common counterpart, the connections created should preferably be more valuable than those connections which the common counterpart is able to create by itself without directly joining its counterparts. In short, when gauging the (small) chances of enriching an existing relationship vs. the (high) risk of endangering an existing relationship, it is likely that companies may refrain from formally and explicitly connecting relationships to common counterparts.

An additional consideration concerns the reactions of common counterpart or counterparts with common relationship features[2]. When two companies have a common supplier or customer, but make no attempts at joint coordination of the respective relationships even if they are aware of the possibility, then it is the common counterpart who has sole responsibility for connecting the relationships. (That is, it is or can be regarded as a "Bridge", cf. Burt (1980)). However, if the two companies would start to coordinate their respective relationships to a common counterpart they would be making a coalition – being able to act as a "pressure group" in relation to the counterpart. For some purposes, this may be beneficial, e.g. getting a supplier to expand or develop in a particular direction. However, it may also lead to problems. Firstly, a common supplier or customer may resist such coordinated pressures since it feel it is "losing some degrees of freedom" (due to no longer being a bridge). Secondly, if two companies form a coalition with the aim of connecting their respective relationship to a common counterpart, the coalition may appear as a "more important" customer or supplier, and the direction expressed by the coalition may be more difficult to avoid or resist for the counterpart. But, this also means that should the two companies change their "common mind", or the direction suggested should show to be detrimental for the common counterpart, they would have been more clearly "responsible" for the unbeneficial path followed by the common counterpart. To form a coalition which is

[2] Connections may be initiated by third parties, that is a counterpart of one cluster company may ask to be introduced to another cluster company, through the former cluster company. However, in this paper, we only consider attempts at connecting relationships which are not initiated by third parties outside the cluster initiative.

difficult to avoid for the third party, is in some aspects to accept responsibility for the affected common counterpart. And, in cases where the affected company is an important counterpart, it may endanger the business of all the companies in the coalition

Another reason why a common counterpart, or counterparts with common relationship features, may oppose active attempts by their counterparts at connecting relationships of theirs may be related to the *informality* and *complexity* of relationships. In informal relationships, not all elements are regulated (*ex ante*) by contract, and when information is exchanged it is not always (made) clear which pieces of information are confidential (IP) and which pieces can be openly exchanged with some (semi-confidential) or with all others (non-confidential). Hence, what one part may view as a piece of information which it cannot possibly imagine can be problematic to exchange with third parties, the other part may view as secrets (von Hippel, 1976) and deeply problematic to exchange with third parties and view it as a breech of trust if the counterpart has done so. If there is uncertainty of which is confidential vs. non- or semi-confidential information, and one fears creating negative effects, it will likely that the strength of the relationships involved will influence whether connecting behaviour is pursued. That is, the fragility or resilience of the relationships, and the future expectations to the relationships under "connection considerations", can have an impact on planned connecting actions (but little on unintended actions).

Based on the discussion above, we consider the six different connecting modes in more detail. It may be that the companies only attempt at making connections when they perceive the possibility for positive connections to be high and the risks of negative connections to be low. If two parties have developed a substantial relationship, based on mutual trust and respect, and which is important to both, it is likely that both parties will be very cautious when connecting their relationships to common parties. In other words, if the relationship is resilient, it is less risky to undertake joint attempts at coordinating relationships than when the relationships are more fragile.

Hence, a low representation of Mode 1A seems to follow a logic of "don't mess with my relationships". A somewhat similar logic may apply to cases of Mode 1B, where one company has an established relationship to a counterpart which other cluster companies may like to develop relationships to, or vice versa. As described by an informant: *"if you are invited to look at other companies' customer and suppliers, then you should behave as if you are in a very expensive glass store, only move around very cautiously and remember to not touch anything"*. While there are more examples of Mode 1B than 1A; it seems that the cluster companies have found a way in which to "safely" attempt the making of connections, or relationship beginnings, between some of their counterparts and other cluster companies. Mode 1B seems to follow a logic of "let me introduce you to my distant acquaintances", with little risk or obligations attached, and with the clear understanding that after the initial introduction, the possible development of any relationship between the parties having been introduced, is not the responsibility of the introductor. None of the companies indicate that they believe that introducing another cluster company to one of their counterparts may benefit their own relationship to this company over time.

Mode 1C concerns making connections when a counterpart is new to both. In such cases, the cluster companies are "travelling companions with the same end point". None of the companies have invested in the development of a relationship to the potential counterpart, and the challenge is rather one of finding counterparts which are interesting for both to pursue a relationship with.

Mode 2A concerns situations of "exchanging experiences" related to different counterparts, which gives it a kind of therapeutic experience. Also in this situation it may be difficult for the cluster companies to assess what can be exchanged and what cannot. Even if the connecting does not focus on one single third party, the two third parties concerned may become aware of the connecting actions in the cluster initiative, and may disapprove of it. Furthermore, in order to exchange experiences from one relationship of one party to a relationship of the other party, may be very challenging venture since the connecting is done in one dyad but concerns experiences in two other dyads and therefore require much de- and re-contextualising.

Mode 2B concerns one cluster company "giving advice" to another cluster company in relation to a type of third party and may be less challenging for the party receiving the advice than for the one giving it. Mode 2C concerns "fellow explorers in unknown terrains", and while the venture is challenging as such, it does likely not endanger the existing relationship between the two cluster companies.

CONCLUSION AND IMPLICATIONS

So far, the cluster companies have only to a limited extent used the cluster initiative in order to develop their business networks. This may, among other things, be due to the NCI cluster having existed for a short time period only, and there being few substantial relationships among the cluster companies. On the other hand, some of the cluster companies have made attempts at developing their business networks by creating connections among established and/or new relationships. Creating connections across the business network of cluster companies is an endeavour encircled by uncertainty, and the relationships which become connected may be either enriched and/or endangered by such new connections. Furthermore, the involved relationships may be affected in very different ways, and to different extents. Therefore, companies that take part in a cluster initiative are faced with non-trivial choices regarding which connections they should pursue and which they should refrain from. Such attempts have to be judged against the time and energy required, and the anticipated constructive effects and anticipated deleterious effects such connections may create. Moreover, such attempts would require some degree of openness and willingness to share experiences among (subsets of) the cluster companies and, the cluster initiative ought to, at least, provide an arena for raising these kinds of questions. Following the logic of the six suggested connecting modes, we emphasize four different ways in which a company can utilize the cluster to strengthen its business network.

Strengthening existing relationships. Following the logic of Modes 1A and 2A, a company can cooperate with another cluster company in order for them both to strengthen their existing relationships with either a common counterpart, or two different counterparts. This can include a common supplier where both cluster companies want to improve certain aspects at the supplier, such as quality routines in relation to the manufacturing process, or two different customers within e.g., the maritime sector, and where both cluster companies see a potential for sharing knowledge. For the NCI, the cluster companies make use of a number of common suppliers, and therefore, there may be a potential for cooperating on these issues.

Being introduced to important counterparts of others. Following the logics of Modes 1B and 2B, a company can cooperate with another cluster company in order to establish a new

relationship with one of the cluster company's counterparts, or, and by drawing on a relationship that the cluster company holds with a counterpart, with a third company. This includes the utilization of another cluster company's business network for the establishing of a new business relationship. For the NCI, several of the cluster companies possess well-developed relationships with both customers and suppliers with which it may be relevant to develop relationships for other cluster companies. In a similar vein, methods from another cluster company's relationships with counterparts can be transferred and utilized in the process of establishing a new relationship.

*Introducing one's important counterparts to others***.** Closely connected to the "being introduced" approach, a company can cooperate with another cluster company in order to assist it in establishing a new relationship, either with one of its counterparts, or, by drawing on one of its own relationships with a third company (Types 1B and 2B). I.e., the same type of effect as above, however, with a reversed logic, i.e., this time the company assists another cluster company in the establishment of a relationship. For a single company, this type of effort can lead to other positive effects over time, e.g., from either of the two parties that are connected. Again, within the NCI, and taken into consideration that there is little face-to-face competition within the cluster, there is considerable potential for creating this kind of effect. On the supplier-side, several of the NCI core companies are in need of similar types of suppliers, e.g., within plastics, metals, design, and electronics, and can thus benefit from sharing suppliers. Thus, a company can, by assisting another cluster company in using the same supplier, experience improvements in its own relationship to that supplier.

Establishing relationships with new counterparts. Finally, and following the logic of Modes 1C and 2C, a company can cooperate with another cluster company, either for each of them to establish a relationship with a common counterpart, or for each of them to establish relationships with two different counterparts. This approach can be used as a means of 'sizing up', thus becoming more interesting for the counterpart, or as a risk-sharing approach, or as a way of exchanging experiences and creating joint learning. For the NCI, this approach projects as particularly important in relation to approaching new, international customers that regard each of the cluster companies as too small. Several of the cluster companies develop and market complementary products for the maritime industries and the oil and gas industries, and this approach can be used in order to strengthen the access to new customers.

For the cluster initiative as a whole, stimulating the kind of networking captured by the four different approached described above may be an important issue. It would imply that the cluster coordinator would encourage the cluster companies to open up their business networks: to share knowledge on and across their relationships to suppliers, customers, and other cooperative partners. In this way, interesting avenues of business network development may be identified and pursued. On the other hand, the cluster companies have invested considerably in their business relationships, and the value of the relationships may increase due to constructive effects and/or decrease due to deleterious effects from the creation of new connections. The anticipation of such effects, and the preparedness to accept unanticipated effects, may induce the cluster companies to exhibit different degrees of risk seeking behaviour. While development of the cluster is important, costs and revenues for the cluster companies stem primarily from doing business in their respective networks. Therefore, the respective cluster companies should consider to what extent their business networks are enriched and/or endangered by new connections created through the cluster initiative.

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