



NTNU – Trondheim
Norwegian University of
Science and Technology

The Role of Social Relations in the Prosperity of Clusters

The impact of the content, the structure and
external factors

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Preface

The following master thesis is our contribution in the subject Innovation and Entrepreneurship, TIØ4945, and concludes our studies at NTNU. The thesis was conducted in the spring of 2014 by Kristina Hoff Wanderås and Elin Kathrine Saunes.

This master thesis aims at providing a better understanding of the role of social relations in clusters. This is done through exploring the concept of social capital and how it is formed within the setting of structured clusters. We have also gained insight in research methods, and last but not least, the journey of writing this thesis has learned us a lot about the value of discussion and cooperation.

We would like to thank all interview subjects for participating in our study, and especially Roger Dalsegg and Stein-Ivar Hansen for introducing us to the concept of clusters. Further we would like to thank Professor Roger Sørheim for support, guidance and discussions in the process of writing this paper.

We would also like to thank friends and family. Kristina would especially like to thank her family for always being encouraging, and Susanne, Camilla, Oda and Monika for their support and friendship. Elin would like to thank Kirsti, Stina and Torunn for keeping the spirit high, mamma and the family and especially Jonas for the endless encouragement and support. And of course Amok for being awesome.

At the end, both of us wish to give a special thanks to Caroline Berg Eriksen for always being a source of true inspiration.

Summary

In this thesis we seek to investigate how the formation of social relations affects the success of clusters. Thus, our main research question is: “*What role do social relations play in the prosperity in clusters*”. To answer our research question we conducted an exploratory case study with research subjects from two structured clusters. These are part of the Norwegian Centers of Expertise (NCE) program; one is located in Trondheim, the other in Horten. The studies were conducted by applying the activation framework proposed by Adler and Kwon (2002).

We see that there has been put too much emphasis on facilitating network structure not the content. This is because we found that lasting and prosperous relations depend on the content of relations, not only the structure. In addition we found that external factors impact the formation and outcome of social relations. Our findings imply that the external factors time, shared goals and market were especially influencing.

Our findings suggested that there is a need or multilevel involvement within the cluster. To achieve this, we imply that the firms have to dedicate more time and resources; hence we call for more action. Further, the implications we suggest for the NCE administration is to focus less on geographical proximity and be aware of the market situations when creating cluster programs. The implications for further research are that we see a need for more research on social relations in clusters, and especially recommend a long-term study.

Sammendrag

I denne masteroppgaven ønsker vi å undersøke hvordan sosiale relasjoner påvirker suksessen til klynger. Vår overordnede problemstilling er: "Hvilken rolle spiller sosiale relasjoner for fremgangen i klynger". For å besvare problemstillingen vår gjennomførte vi en utforskende casestudie med case intervjuer fra to strukturerte klynger. Begge er en del av Norwegian Centers of Expertise (NCE) programmet; en er lokalisert i Trondheim, den andre i Horten. Studiene ble utført ved å bruke «The Activation framework» som ble foreslått av Adler og Kwon (2002).

Vi ser at det har blitt lagt for mye vekt på å tilrettelegge for nettverksstruktur fremfor innholdet i disse relasjonene. Dette er basert på våre funn, som viser at varige og fremgangsrike relasjoner avhenger av innholdet i relasjoner, ikke bare strukturen. I tillegg fant vi at eksterne faktorer påvirker dannelsen og utfallet av sosiale relasjoner. Våre funn antyder at de eksterne faktorene, tid, felles mål og marked var spesielt viktige.

Våre funn tyder på at det er et behov for involvering fra flere nivåer i bedriftene i klyngen. For å oppnå dette, mener vi at bedriftene må dedikere mer tid og ressurser. Videre foreslår vi for NCE administrasjonen at de må fokusere mindre på geografisk nærhet og ta hensyn til markedssituasjonen når de legger opp klyngeprogrammer. I tillegg ser vi et klart behov for videre forskning på sosiale relasjoner i klynger, og vi anbefaler spesielt et langtidsstudie.

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1. Introduction

The last decades there has been a lot of focus on the benefits of being part of a cluster. Some famous examples of prosperous clusters are Silicon Valley and Hollywood, both of them extremely successful within their industry. The literature on the field has related the positive effects of clustering to the firms' competitive advantage and ability to innovate (Porter, 1998).

“The cluster becomes a vehicle for maintaining diversity and overcoming the inward focus, inertia, inflexibility, and accommodation among rivals that slows or blocks competitive upgrading and new entry”
(Porter, 1990, p. 87)

Now we see an emergence of initiatives trying to replicate these beneficial environments of natural clusters. Examples are InnoBB in Germany and the Norwegian Centers of Expertise - program (NCE), which are governmentally funded and initiated. But there seems to be difficulties tied to it, as there has been many failed attempts at replicating successful cluster environments (Isenberg, 2010). This intrigued us to look into what causes the prosperity in clusters.

The cluster literature relates the prosperity of clusters to interaction between firms (Padmore & Gibson, 1998). It has also been suggested that social relationships play an important role in defining the capacity of the region to evolve, adapt to shocks and accommodate to new demands (Feldman et.al, 2005). Thus, structured clusters try to imitate the environment in natural clusters in order to reach goals of increased innovation. And we see that facilitating social relations is an important part of this. But what is so special about social relations in clusters? How does they differ from other types networks?

Literature distinguishes between pure business networks and clusters. Networks can be defined as collaborative business activities carried out by discrete, usually small groups of firms. While clusters are systems in which

membership is based on interdependence and making a contribution to the functioning system (Rosenfeld, 1997). Thus, cluster networks seem to have a higher level of social interaction, and through this mutual interdependence. We see that interdependence and benefits stemming from being part of a unity can be related to social capital. Social capital is comprised both of the network itself and the assets that may be mobilized through the network (Nahapiet & Ghoshal, 1998). Our notion is that the x-factor that might distinguish networks from clusters is related to social capital, especially the content of social capital. Thus, we choose to look at the role of social relations in clusters through the lens of social capital. The activation framework proposed by Adler and Kwon (2002) incorporates both the structural and content part of social capital, and can be used to estimate the success of forming social capital. This we use as framework for investigating our main research question:

- What role do social relations play in the prosperity of clusters?

To further refine our question we pose two sub-questions:

- What role does the structural part of social relations play in the prosperity of clusters?
- What role does the content of social relations play in the prosperity of clusters?

As mentioned, structured clusters try to replicate the environment of natural clusters. And natural clusters are often influenced by their external factors. The activation framework does not take into consideration how this context impacts the formation of relations. Due to the importance of external factors in natural clusters, we wish to expand the framework by investigation our third sub-question:

- What external factors are important for social relations in clusters?

We conducted a qualitative study of two clusters in the NCE program, in Trondheim and Horten in Norway. Here we looked at what measures the cluster administration took to replicate the prosperous environment of natural clusters. We found that they focused a lot on networking events and

collaboration projects. We saw that the content of the relations are of importance for truly realizing and taking advantage of the potential in the cluster. But that was not a priority in the firms we interviewed. Thus, they were not able to take the relations to the next level and prosper through them. We also found that the external factors, such as time and incentives have a great effect on the outcome of the social relations. This implies that these factors also have to come into consideration in facilitating measures made by cluster programs.

In this thesis we first present our method of research and how we conducted our study. We will then present theory on the fields of clusters and social capital. Through the activation framework we analyze our findings and discuss our research question. Further we will add to the activation framework and conclude that social relations are important, but they need to have content to be fruitful. To attain this content one has to pay attention to the external factors such as time and incentives.

2. Method chapter

2.1 Introduction

Choosing the right research method for one's research is important to gain the most knowledge, avoid mismatches and to find the right type of information (Yin, 2009). Therefore, to answer our research question: *What role do social relations play in the prosperity of clusters?* We have chosen to use the case study research method. The case study method is usually a good method to use when researching and contributing to knowledge around the topics of the individual, group, organizational, social and political situations (Yin, 2009).

“You would use the case study method because you wanted to understand a real-life phenomenon in depth, but such understanding encompassed important contextual conditions - because they were highly pertinent to your phenomenon of study” (Yin, 2009, p. 18).

In our master thesis we wanted to look closer at how the firms conduct themselves and create social relationships in structured clusters. The way a firm looks at their relation towards the cluster is highly dependent on their employees, and especially the employees that work directly towards the cluster. These relationships are constantly shifting, because of factors, such as the dependence on the personality of responsible employees and shifts in the market. These factors lead to changes in the focus and strategy of the firm. Due to these variables, we felt that the most accurate answers we could get, was directly from the source itself, and therefore through interviewing the members of the two clusters we chose to look at.

2.2 Our motivation

Our motivation for writing this thesis occurred during the fall of 2013. Our pre master thesis researched the theory of clusters, social capital and innovation. Through this work we found that incentives for participating in clusters are important to gain the most out of being a part of a cluster. Further we found that these incentives were important to create sustainable clusters. We also

believed that the activation framework initiated by Adler and Kwon (2002) missed some factors to really explain the activation of social capital. And that was what we wanted to investigate. In addition to this, we found, that structured cluster programs seem to try to facilitate and create “unnatural” connections. We had a hunch that it might not be easy to create a cluster if the relations between individuals were planned, and not natural.

Further, through our work with our own start-ups, we have seen how networking and social relationships often are essential for a business. The acknowledgement of how important these factors are, and finding little research on the topic, sparked an interest in how social relationships work within industry clusters.

2.3 The choice of method

The case study method can be used to explain the otherwise only observable, which was the case in our research. It is hard to explain statistically and by numbers how social and relational structures appear. But to use the case study research method, the three following conditions should be thought of: 1) the type of question being asked. As our research question is “*what role do social relations play in the prosperity of clusters?*” Our question is an open and exploratory one, which is often useful in case studies. 2) The extent of control an investigator has over actual behavioral events. As we do not have very much influence over how the employees conduct their relations between themselves. And number 3) the degree of focus on the contemporary opposed to the historical. Our focus is what is happening right now, and not historical (Yin, 2009) which implies that we should conduct research in real time. All conditions are linked to which research method one should conduct one's research in; either it is the method of experiment, survey, archival analysis, history or case study. In our situation using case study method, with conducting interviews was perceived as the right choice for our thesis.

With choosing to use the case study method, the method can be applied to exploratory, explanatory and descriptive studies. One of the important

indications of what type of study is the way one's question is posed. A "what" question can be justifiable as a case study question and as an exploratory study. Likewise "how" and "why" are explanatory questions, which can be researched with a case study. But if the "what" really is asking about "how many" or "how much" one might consider not conducting a case study method. To choose the right method of study one has to be aware of how one chooses to point his or her question (Yin, 2009). One can claim that in the case study method, the process of researching what is going on, is more important than a clear answer (Yin, 2009) And therefore it is often important to acknowledge that the research question one starts out with often is tentative (Eisenhardt, 1989). In our case we started out with a theoretical area we wanted to look at, and narrowed down our research question after the retrieval of information.

In conducting the research for our thesis it was early clear that there would not be one single answer. We rather found indications as to how structured clusters influence and contain their social relations processes, and how important it seemed to be. With case studies possessing an ability to dig into the "here and now" situations through for example interviews, it has allowed us as researchers to retain the holistic and meaningful characteristics of the real life events (Yin, 2009) and conduct our research based on this. Investigating a contemporary phenomenon such as social relationships in depth, within its real life context, we have found to be very useful. Especially since the boundaries between phenomenon and context are not clearly evident. As Yin (2009) has pointed out, very often the context where the phenomenon takes place, is often almost as important as the phenomenon itself.

2.3.1 Single versus multiple case studies

The single and multiple-case studies are two variations of case design. The single case study usually reflects one case, and it is better equipped to describe processes, but less equipped to explain the cause of action. One could argue that a single case study should not be regarded as a complete study in its own (Yin, 2009). To gain a broader understanding, and to suggest more general findings, we selected the multiple case study as our method. Multiple case studies often provide a broader empirical richness and may provide an empirical foundation for generalization and theoretical insight (Eisenhardt, 1989). And within the multiple-case version there are some differences. One can make a comparative analysis of the similarities, or a comparative analysis of the differences within the cases (Widding, 2006). By analyzing cases that are seemingly alike the researcher can look at the dependent variables or the variables that describes the reason. Another approach could be to describe the variables that were rooted in the same foundation of theory. The latter is the manner of how we have conducted our research. As our cases are seemingly alike we chose to look at our findings up against the theory we have found through our literature review.

2.4 Conducting research

2.4.1 Planning and collecting information

Based on the findings of our pre master project paper conducted in the fall of 2013, we found that looking into how structured clusters work and prosper would be the foundation of our master thesis. The thesis is written with theory gathered from mainly research articles, books and other information sources on the field of clusters, cooperation and social capital and case interviews.

To get an overview of current theory we started out with an unstructured literature search in JSTOR, Google Scholar and Scopus. The search gave us the most cited articles within areas of research using search words such as “social capital and innovation”, “clusters and innovation”, and “structured clusters”.

The search provided us with insight on the main topics within these fields of research. We then extended our theory basis by snowballing, where we reviewed articles found in the references list of the articles from our first round of search. We also searched for other work by authors that appeared in the reference list of articles we read. This literature search lead us in the direction of themes we found especially interesting, by leading us into different fields within the broad subjects of social capital and clusters. To narrow it down we chose to focus on structured clusters, social capital and the content of relations. These topics were the ones felt were the most interesting for the thesis.

We selected the clusters that are located in Horten and Trondheim. One is close to us here in Trondheim, and the other we previously had contact with, through our pre master paper. In addition to the literature search we attended one of the arrangements within each of the cluster. Both of the events were so called breakfast meetings, planned and conducted by the cluster administration. In these meetings we listened, took notes and observed. Attending these arrangements gained us some insight to how the cluster members interacted and who attended. We also met several of our chosen interview objects at these meetings, and we experienced that approaching the subjects in person often ended in a planned meeting then and there, rather than waiting for our emails to be replied.

We have not separated the two clusters and compared them to each other in this thesis. Instead we have chosen to look at the cases within both of the clusters as being a part of NCE. Therefore it is the NCE program that acts as the institution we are looking at. The clusters were also selected based on that they hold certain similarities them. Both of the clusters are high technology clusters, they are located in very close proximity to a university or college and research institution, they also hold a strong tradition for conducting heavy industry in the area that surrounds them. But most importantly is they both have been chosen to be a part of the Norwegian

Center of Expertise program. They became members at the same time in 2006, and the span of their NCE project is soon to be expired.

2.4.2 Research population

Our research population is defined as being a member or in close proximity to one of the Norwegian Centers of Expertise clusters. The clusters has a set of inclusion criteria that defines who can become and who is a member of the cluster. Which implies that our research population is somewhat defined by the inclusion criteria of the cluster.

Before we conducted our research we anticipated that there were possibilities to find both similarities and differences between the clusters. As both clusters are located in Norway, and they hold the mentioned similarities, we assumed that there were some fundamental similarities between their use and activation of social capital. This we reckoned was due to factors as for instance cultural codes and norms tied to being Norwegian. Otherwise the structure of the cluster is mainly similar because of the official organization that surrounds them, that can impact how they conduct business. On that note we do not neglect that there might be differences in the culture and norms within the clusters. Norway tends to have differences in how to conduct oneself in the south and the north, but we believe that these are minor and not of great significance in our research, especially since we have not taken into consideration where our case subjects originally are from. Other environmental factors can also cause the setting to be different in each of the clusters. We believe that the most important of the environmental differences are the size of the city surrounding and cluster, proximity to universities and R&D environments and the age of the cluster. We do not neglect that they are important factors. But in the research for this thesis we have chosen not to take into consideration these factors, as we have not seen them as pressing matters in our subject of research.

2.4.3 Interview objects

Our strategy to approach the cluster was to contact the NCE leaders first. Through them be invited to a cluster meeting and there approach relevant interview subjects. We found that interviewing the cluster leader was the most productive way to find out how the cluster leader aims at structuring the cluster, and how the cluster and the initiative from the firms is perceived by them. Further the other subjects we selected for interviews were based on the fact that they were one of a few that represented their own firm in the cluster, and therefore attended meetings.

Our plan was to interview those employees that had one or the other connection to the cluster. We sought after those who were either the main contact or attended several arrangements organized by the cluster. In our case we felt that there was no use in interviewing employees that did not have anything to do with the cluster, especially since our questions were aimed at those who knew of the cluster. We conducted one interview with each candidate and had six candidates from each of the clusters, all together we interviewed 12, and all of the completed interviewed were used in the thesis.

The candidates chosen for interviews were divided into; one from the research milieu in each of the clusters, the mentioned cluster leader, three mid-level managers, where one was part of larger companies in the cluster, Sensoror and Kongsberg Maritime. We also decided to interview two companies that were sort of outsiders. One was a mid-level manager in Teekay Petrojarl that is not a part of the cluster. This was to gain the insight of a company that might benefit from being part of a cluster - but has chosen not to. And the other one was a start up with one employee and still in the product development phase - and part of the incubator within the cluster. We think that this selection of interview subject helped us define the limits for generalization of our findings (Eisenhardt, 1989). The table below shows certain stats about the firms we chose for our research. For simplicity we will hereafter refer to the cases by the codes given them in the table below.

Table 1 Overview of cases

Firm	Code	Position	Firm size (number of employees)	Member since
Noca	T1	COO	45	2006
Kongsberg Maritime	T2	General manager	1966	2006
Washington Mills	T3	Manager Operational support	105	2014
Sintef	T4	Research scientist/ Area manager, NCE	1188	2006
NCEI	T5	Cluster manager	1	2006
Teekay Petrojarl	T6	Director, project services.	186	-
7Sense	H7	CEO	7	2011
Sensoror	H8	VP, Sales and marketing	68	2006
MicroTech Innovation	H9	CEO	-	2006
NCE-MNT	H10	Cluster manager	1	2010

HBV	H11	Professor	166	2006
Broentech	H12	CEO	1	2013

2.4.4 Interviews

A case study interview is likely to be fluid rather than rigid (Yin, 2009) and that was our experience. The interview guide we crafted for the purpose of interviewing our cases, stayed unchanged throughout all of the interviews. We found that the interviews seldom followed the guide strictly. Very often the subject answered questions we had, or gave other relevant information through talk of different subjects. In this way we received a lot of unexpected information, which we felt was a good thing. Our questions were asked in an open manner, with the questions opening with either “how do you feel” or “in your experience”, and they were more topic related than specific questions. All interviews were conducted within one hour and could be regarded as shorter case study interviews (Yin, 2009). The interviews were carried out at the firms’ own locations, except for two that were conducted over Skype.

As researchers we chose to have one of us that mainly asked the questions and one that mainly observed and asked clarifying questions. This manner increased the chances for looking at the findings in divergent ways (Eisenhardt, 1989). Due to interpretation and the subjective understanding one has, the other can act as a counterbalance. Each candidate was interviewed one time, and kept in touch with over email in case we had further questions. We recorded all of the interviews with an iPhone or iPad.

We transcribed all the interviews. The interviews were recorded mainly to make sure we remembered all the information, and it provides a more accurate rendition than just taking notes. All interview subjects were informed of the recording and approved. They were also given the opportunity to see and comment on the transcribed version of the interview.

We felt that there were factors that may have influenced the interview. One example is that we at times felt that as young students, we were lectured about how the firm and business world functions, instead of telling us how they see, for instance, their culture. Because of this, we felt that we were not always looked at as peers, which can have affected the answers. There were also only men available for the interviews, which may have had an impact on the answers. Hence, there is a chance there is little diversity in the information due to gender, culture, age gap and knowledge of each other.

Ideally one should stop adding cases when theoretical saturation is reached (Eisenhardt, 1989). As we were limited by time, we planned on forehand that we would need 10-14 interviews. It has been stated that fewer than 4 - 10 cases can work well (Eisenhardt, 1989). In our research situation we needed more than this, to be able to say something more generally about the cluster members' social structures. This choice was based on the fact that the way people experience social structures are highly personal. We decided to stop adding cases after conducting 12 interviews as we felt that the information we found was repeating itself.

2.5 Case-studies and analyzing

2.5.1 Transcription

We transcribed all the interviews. Each interview was transcribed within the timespan of three weeks in April. Conversational sounds like "mhm" and "oh yes" were left out of the transcribed document. One interview was only partially transcribed due to insufficient absorption, but only the parts of the interview that were thoroughly transcribed were used. All interviews conducted in different dialects of Norwegian were "translated" to Norwegian bokmål. During transcribing we kept notes of themes that we felt were important, this gave us an opportunity to see certain recurring themes. It also was done to keep track of what was said, and to see if there were unanswered questions. Also we were able to detect where there was an

overlap in our research, which helped the investigation to focus (Eisenhardt, 1989)

2.5.2 Reduction and analyzing of case material

Conducting the analyzing of the case study we especially saw the benefit of being two researchers. Multiple investigators may have a benefit in conducting this type of research, as it is possible that it enhances the creative potential of the study through seeing different perspectives (Eisenhardt, 1989). As mentioned above, we both were present in the interviews and we analyzed the material together, and we both got a fairly fair overview. The very subjective thoughts we had, were discussed and weeded out in this part of our research.

To sort out the information we made a matrix with the main categories based on the theory, the activation framework and our research questions. First, all the interviews were broken down roughly into what was relevant for our case and what was not. Further we divided the quotes into categories. The categories were the three factors for the activation of social opportunity, ability and motivation. Through this categorization we found the fourth element of external factors that we added. Further we went through the categories and shredded those quotes that were not directly relevant to our research. Then we divided each category into smaller sub-categories. After this we translated all the quotes before we thoroughly discussed the context of each finding. Through the discussion we looked for cross patterns and found specific recurring themes and points of interest.

2.6 The limitations of the case study method

Case studies have been criticized for the subjective approach to a research theme. It is and should be hard to generalize, because of the focus on micro level opposed to the macro level that research often seeks to explain (Yin, 2009). The case methods concern might be the analytical approach, and especially comparative case studies. But on that same note it might also be the method with the most significant contribution (Widding, 2006). As other research methods, once one has conducted multiple sets of case studies around one topic, the case study might be generalizable towards theoretical propositions (Yin, 2009).

While systematic data can create foundation for theories, it might be the anecdotal data that enable us to build them. To build theory through case, it is important for case studies that every researcher that uses the method must work hard to report all evidence fairly, to gain the insight and objectiveness that research needs. If the ambition is to contribute with the research, one must construct a case design that takes into consideration the weaknesses case studies might have (Yin, 2009). Soft data allows one to be able to explain the theories and therefore it should be possible to make some general assumptions. These assumptions can only imply if the researcher takes the time to design a case that takes into consideration the subjective approach and chooses the research objects with great consideration (Yin, 2009).

The lack of rigor when conducting a case study is also of a great concern. Sloppy investigators and unsystematic approaches affect the outcome of the research. It is a challenge to choose the right cases to study. And also to ask the right questions without manipulating the subject, by projecting own thoughts - either knowingly or subconscious. The criticism against case studies seems to be mainly based on the interview situations. It is often imply one interview object; this leads to the sense of the study and method being mainly subjective (Yin, 2009). We do not deny that a subjective approach could present in our research. Due to factors such as that we have not conducted a case study before, and that to be truly objective might be almost

impossible. This, and the fact that there might be other things that influence the interviews must be taken into consideration. Our goal, in the process it has been to write this thesis has been to have a wide approach to both our theoretical research and conducting our empirical foundation. Therefore we think that through our study we have found an opportunity to say something about how the social structures might work in clusters, and an indication to something that can point out where to look next.

3. Literature review

3.1 Introduction

In this chapter we will create a theoretical foundation for investigating our research question: *What role do social relations play in the prosperity of clusters?* First we will discuss theory on clusters and why the prosperity of clusters is important. We will start with a look at Porters diamond model and theory on how clusters affect firms' competitive advantage; following this we will discuss what role social and economic interactions play in the prosperity of clusters. Then we will take a closer look on social relations and how this is related to the concept of social capital. At the end of the chapter we present a framework for the activation of social capital within the setting of a cluster. This framework will later be used for investigating social relations in a cluster setting.

3.2 Definition of clusters

The concept of clusters is criticized for being vague, chaotic and to contain no clear boundaries, both in an industrial and geographical sense (Gallardo & Stich, 2013; Rosenfeld 1997). The variety of ways to define clusters has not led to one universal theory or framework. Some theories seem to define any industry in near proximity a cluster, while others use frameworks with checkpoints to identify clusters. Governmental agencies, needing to avoid charges of favoritism, tend to be as inclusive as possible regarding clusters. The term is typically used in a very broad and general sense, often based on scale of employment, perceived growth potential and political influence. Often the aim is to gain political support (Rosenfeld, 1997). Academics and researchers are focused on finding numeric parameters in order to conduct statistical or economic analyses, and business schools have favored models based on comparative advantages in global markets. As the academic literature has yet to come to a sole definition of what is properly defined as a cluster, we will start by defining how a cluster is defined in the context of this paper.

We choose to start with Porters' (1990) view of clusters, and how he explains the emergence of clusters. He describes clusters as an effect of the diamond model. The model consists of the four attributes factor conditions, demand conditions, related and supporting industries and firm strategy, structure and rivalry. He states that these conditions are highly interdependent, and together they create an environment that promotes clusters of competitive industries. This environment is especially linked to two factors, rivalry and geographic concentration (Porter, 1990). This is because domestic rivalry promotes improvement in all the conditions in the diamond model, for instance by promoting the formation of related and supporting industries. The importance of geographic concentration is explained by its effect of elevating and magnifying the interaction of the other conditions in the diamond model. This can for instance be because geographic concentration increases the interaction of firm structure and demand conditions. So, we have two parameters that seem to enhance cluster formation, domestic rivalry and geographic concentration.

3.2.1 Geographic concentration

Let's first look at geographic concentration. What role does it play in an increasingly global economy and at what level does the concentration occur?

"Clusters occur in many types of industries, in smaller fields, and even in some local industries such as restaurants, car dealers and antique shops. They are present in large and small economies, in rural and urban areas, and at several geographic levels (nations, regions, cities) Clusters occur in both advanced and developing economies, although clusters in advanced economies tend to be far more advanced"

(Porter, 2000, p.18)

Hence, clusters can occur within practically any type of industry, and at several geographic levels, ranging from nations to cities. Others have

broadened this definition further by stating that clusters are not bounded by political boundaries, and hence can be viewed as economic regions that may or may not be within the same region or even country (Rosenfeld, 1997). Meaning that one can find successful clusters crowded into corners of a province, spanning several cities, or straddling an international border. Hence, geographic concentration at some level is a trait of clusters, but it is defined too widely to be used as a sole characteristic. So what is it about geographic concentration that makes it an important trait of clusters?

Porter (1998) states that there is a paradox connected to the importance of location. Global sourcing diminish former disadvantages such as input-costs, instead competitive advantage depend on how a company uses the inputs. And to use the inputs productively requires continual innovation. He states that what happens inside companies are important, but the immediate business environment outside companies plays a role as well. Hence, the importance of geographic concentration lies in the effects caused by being located physically close. And the role of the outside environment is revealed by the existence of clusters (Porter, 1998). Herein lies the paradox that the enduring competitive advantages in a global economy lay increasingly in local things. These local things are knowledge, relationships and motivation, things that distant rivals cannot match (Porter, 1998). Hence, location and geographic concentration has an effect on the competitive success of companies, and this effect is closely knit to knowledge, relationships and motivation.

3.2.2 Rivalry and interdependence

In addition to geographic concentration, recurring terms when defining clusters are interdependence (Rosenfeld, 1997; Rocha, 2004), interaction (Padmore & Gibson, 1998; Pitelis, 2012) and interconnected (Porter, 1998). This brings us back to the domestic rivalry factor in the diamond model. The importance of this factor is attributed to its effect on for instance the formation of related and supporting industries. This is in line with how Porter (1998)

states that clusters encompass an array of linked industries and other entities that are important for competition.

So, clusters consist of interconnected companies, but what is it that distinguishes clusters from pure networks? Networks can be defined as collaborative business activities carried out by discrete, usually small groups of firms. Typically the networks are formed in order to generate sales and profits through activities like joint exporting, production, R&D and product development. Clusters, on the other hand, are systems in which membership is simply based on interdependence and making a contribution to the functioning system (Rosenfeld, 1997). We interpret this as an interdependence that ranges beyond very concrete goals of for instance generating sales through joint exporting. This view is backed by how clusters can be tied to the ease and availability of linkages that allow people to form personal relationships of trust, cooperation and competition (Rosenfeld, 1997). Hence, we see that clusters differ from networks by having a degree of mutual interdependence. This interdependence ranges past that of having a formal market relation, but is taken to the next level by the formation of personal relations.

3.2.3 The prosperity of clusters

We have now tied the positive effect of clusters to geographical concentration and interdependence. But what are the positive effects of clustering? We find that the special nature of clusters is embodied in the following statement:

“The cluster becomes a vehicle for maintaining diversity and overcoming the inward focus, inertia, inflexibility, and accommodation among rivals that slows or blocks competitive upgrading and new entry”
(Porter, 1990, p. 87)

Hence, clusters can be seen as fundamental to competition, productivity and to the direction and pace of new business formation and innovation. To

“maintain diversity” and “overcome the inward focus” can be seen as preconditions for sustained competitive advantage of the firms in the cluster. Porter (2000) states that clusters broadly affects competition in three ways. The first is by increasing the current productivity of firms; the second is by increasing the capacity of cluster participants for innovation and productivity growth. The last is by stimulating new business formation that supports innovation and expands the cluster. Further it is stated that many cluster advantages rest on external economies of spillovers across firms, industries and institutions, meaning that a cluster is a system of interconnected firms and institutions whose whole is more than the sum of its parts (Porter, 2000). Hence by prosperity we mean sustained competitive advantage, and this is achieved through interaction between the firms in the cluster. The relation between prosperity and clusters is also stated in the following:

“A cluster is a concentration of firms that prosper because of their interaction, whether that is through competition or cooperation, or by serving as suppliers or customers in the value-chain” (Padmore & Gibson, 1998, p.627)

So, a cluster has an element of geographic concentration and can be said to prosper because of interaction between firms in that geographic area. This interaction can be both of the social and economic kind. Based on this we choose to define clusters as a concentration of firms that prosper because of their social and economic interaction. Social and economic interaction implies that clusters present a form of infrastructure both at the personal and market level. But as previously discussed this infrastructure raises above that of pure networks, it is linked to the ease and availability of linkages that allow people to form personal relationships of trust, cooperation and competition (Rosenfeld, 1997). Thus, both the structure and the content of the relations in a cluster must be of importance. The positive effects of clustering have led to initiatives trying to replicate these effects. We will now discuss the difference between clusters that have evolved entirely on their own, and those that are placed within some form of administration. The latter being what we choose to call structured clusters. Further we will discuss how social relations are linked

to the concept of social capital, which ends in a framework for the activation of social capital in clusters.

3.3 What are structured clusters?

The discussion so far has been based on research centered around clusters that have evolved on their own, such as Silicon Valley or Hollywood. These are what we choose to call natural clusters. As it seems clear that natural clusters bring with it certain advantages by acting as a facilitator of innovation and cooperation, there have been failed attempts at replicating the collaborative environment found in natural clusters (Letaifa & Rabeau, 2013). And it is stated that even Silicon Valley cannot replicate itself, even if they tried (Isenberg, 2010).

All the same the initiatives to such replications are both public and private, and what we choose to call structured clusters in the context of this paper. Whereas natural clusters can be said to evolve through a bottom-up process, structured clusters introduce elements of top-down thinking. Top-down aspects can be related to that some sort of organizations creates a cluster program with certain evaluation criteria, as is the case with the NCE program (Isaksen, 2009).

It seems like the purpose of these evaluation criteria is to replicate the conditions of natural clusters. This can for instance be to create meeting places for sharing of information and provide incentives for collaboration by facilitating grants. But what is the x-factor of natural clusters? And is it possible to replicate it? Because there seems to be reason to wonder if the government really can build these ecosystems alone (Isenberg, 2010)

It has been investigated why some heterogeneous public-private innovation clusters failed despite the promising levels of geographic, institutional, organizational and cognitive proximities (Letaifa & Rabeau, 2013). It was found that in some cases geographic proximity can be an obstacle to

business networking and communication, and that geographic proximity needs to be complemented with social proximity to generate innovation. According to this study, public-private clusters are less prone to collaboration and innovation, than spontaneous private networks. The reason for this was differences in social proximity. Public-private clusters were found to rely more on exogenous proximities, and less on social proximity. These findings indicate that the dynamics of collaboration within clusters must be further explored. This is of especial importance to those trying to replicate the positive effects of clusters.

We choose to call such clusters structured clusters, thus indicating that there is a difference between them and clusters that have emerged on their own. Structured clusters are initiatives such as the Norwegian Centers of Expertise program (NCE, 2014) in Norway or the InnoBB program in Germany (InnoBB, 2014). These clusters have specific goals to elevate the potential of certain regions or industries. And they fit this description of similar initiatives: Partially or fully governmentally funded initiatives to increase the positive effects of clusters within certain geographic regions or industry fields (Gallardo & Stich, 2013). Thus, this is how we choose to define structured clusters.

We do also see that the existence of clusters do not spontaneously make fruitful relationships more likely to develop and become effective, such relationships do not automatically occur in all cluster (Porter, 2000). They are affected by formal and informal organizing mechanisms; cultural norms also often play a role in the functioning and development of clusters (Porter, 2000). Therefore will we now look at a concept that may shed light on the role of relationships in clusters, and hence on if, and how one may replicate them in structured clusters.

3.4 Introducing the concept of social capital

The definition of clusters as a concentration of firms that prosper because of their social and economic interaction elevates the importance of interaction on the success of companies. But how do firms interact? Porter (2000) states that to some extent the broad influences of clusters on competition depend on personal relationships, face-to-face communication and networks of individuals and institutions that interact. Hence, the interaction can be both at the personal level and between entities of people such as institutions. Porter (2000) also states that close attention to personal relationships is a common characteristic of successful cluster initiatives. This is elaborated by how personal relationships cause many of the benefits flowing from clusters. These benefits are facilitation of linkages, fostering of open communication and the building of trust (Porter, 2000). Hence social relations seem to be an important factor in clusters, and it is related to two factors; the structure of connections and the content of those connections. That leads us to the concept of social capital.

3.4.1 Social capital

Adler and Kwon (2002) define social capital as the goodwill enabled by the fabric of social relations, and state that it is a form of capital that can be mobilized to facilitate action. A fabric can be interpreted as a web of threads, like a network, and the goodwill is the content created by this network. Hence, this definition reflects that social capital has both a structural and content part, in the same way as the social relations that come into play in clusters.

The structural part of social capital has been heavily investigated, and some choose to define social capital entirely on the basis of its structural component. For instance, Burt (1997) views social capital as a quality generated between people, and as a function of brokerage opportunities in a network. Social capital is therefore linked to network positions and the possibilities that arise from information asymmetries. Such possibilities can for instance be that disconnections between individuals in an imperfect market

leave groups of people unaware of the benefits they could offer each other. This means that holes in a network must also be considered when looking at social capital. In addition to create channels for sharing of information, social ties create mutual obligations and dependency between actors, causing assets to get locked into suboptimal exchanges. This view can be summed up as follows; an individual's position in a structure of exchanges can be an asset in its own right, that asset being social capital (Burt, 1997).

Let us now look at the content part of social capital, it is reflected in this definition: Social capital is the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships. These relationships are possessed by an individual or a social unit (Nahapiet & Ghoshal, 1998). According to this definition, social capital is comprised both of the network itself and the assets that may be mobilized through the network. This is clearly related to how Adler and Kwon (2002) say that social capital is a form of capital that can be mobilized to facilitate action.

Action means movement, and hence social capital must cause certain effects. These effects are described as flowing from the information, influence, and solidarity made available by the social relations of the actor (Adler & Kwon, 2002). At the same time Porter (2000) states that:

“Many of the benefits of clusters flow from the personal relationships that facilitate linkages, foster open communication, and build trust. Information is essential to productivity, and relationships that improve its flow will endure and even strengthen after a cluster project ends. Instigating communications is the essence of successful cluster initiatives.” (Porter, 2000, p.32)

Hence one can see a clear connection between the effects of social capital and the benefits of clusters. Both are tied to facilitating information flows and the building of trust due to personal relationships. We have also seen that social relations are constituted of two parts, structure and content. We will now take a closer look at the role of network structure and that of network

content within the cluster setting. We choose to look at each of these elements through the lens of social capital.

3.4.2 The role of network structure in clusters

We have seen that geographical concentration is a trait of clusters, but not a defining one in terms of explaining the positive effects of clusters. Which is in line with findings of Boschma (2005); even though geographical proximity facilitates interaction and cooperation, it is neither a prerequisite nor a sufficient condition for interactive learning to take place. However the facilitating forces of cluster environments has been found to act through various other means. Once a cluster is established and is functioning, they become virtuous, self-reinforcing cycles. Legal and tax frameworks, research institutions and social relationships, as well as the local living environments are areas for public policy intervention. All of these factors help create supportive and positive cluster environments (Feldman et.al, 2005). Geographical proximity is defined as the spatial distance between actors, both in absolute and relative meaning. It has impact on facilitation of cooperation, because when short distances bring people together, it favors information contacts and facilitates the exchange of tacit knowledge (Boschma, 2005). Hence, we consider geographical proximity as a factor that facilitates the establishment of contact points, thus laying ground for the establishment of network structure.

Personal networks - the infrastructure of relations

Network structure can be described as the configuration of linkages between people and units (Myint et al, 2005). It includes links to friends, and friends-of-friends, group obligations and strong and weak ties (Jack, 2005). In other words, the overall pattern between actors, namely who you reach and how you reach them (Nahapiet & Ghoshal, 1998). In a cluster setting this means that network structure incorporates both work related ties to for instance customers, and personal ties such as that to friends or teammates on the soccer team.

It has also been stated that connections does not necessarily have to be direct linkages. Two actors can be connected by a third party, meaning that not only the connections themselves are important, but also the nature of the connections (Nahapiet & Ghoshal, 1998). In a cluster setting this means that you may be indirectly linked to another person through a common contact. For instance, your work as a salesperson in company A gets you in contact with a customer. This customer also has a contact in company B in the cluster. So the persons in company A and B are indirectly linked.

Why does this matter? Because for instance, salesperson A can get information about company B through their common customer contact. Thus, indirect linkages also affect the information benefits made available to actors in a network (Burt 1997). In addition a person's position in a network structure has been stated to affect the ability to get jobs, obtain information and to access specific resources (Thai & Ghoshal, 1998).

This importance of the configuration of linkages has lead researchers to describe the morphology, meaning the pattern of linkages in measures such as density, connectivity and hierarchy (Nahapiet & Ghoshal, 1998). Density describes if many people in a network are connected to each other, or if the connections are mainly one-to-one. The density can vary for instance due to the time you spend with your network. If you spend a lot of time with your group of people (your personal network), you get more occasions to introduce members of the group to each other's. Thus this part of your network becomes denser, meaning that more people in the group share the same contacts (Ostgaard & Birley, 1994).

Another important factor of the structural dimension is appropriable organization. Appropriable organization means if networks that are created for one purpose can be used for another (Nahapiet & Ghoshal, 1998). This is especially interesting for the subject of structured clusters. Because, there we see that one tries to facilitate the building of networks by for instance collaborative projects. The goal is that these connections can be used later in

another setting, hence be used for another purpose than what it was originally created for.

All of the factors mentioned above come into play within clusters. Who you know inarguably affect who you cooperate with, what information you have access to and how you view new opportunities. We will now look closer on a concept called structural holes and how this affects sharing of information.

Structural holes

An especially interesting aspect of network theory is the creation of connections between groups of otherwise unconnected people, so called structural holes (Burt, 1997). Structural holes are interesting, because the distribution of opinion and behavior tend to be more homogeneous within, than between groups. Thus, people who are connected to multiple groups are more familiar to alternative ways of thinking (Burt, 2004). Within a cluster we believe that this applies to both the linking between people within firms and connections between people in different firms. In this paper we focus on structural holes between people in different firms.

Structural holes are disconnections between non-redundant contacts, bridging these holes have been shown to give information and control benefits. The benefits of information come in three forms; access, timing and referrals. The network provides access to information beyond what a person could possess alone, and it holds the advantage of providing that information early. The network also filters information and directs, concentrates and legitimates information received by others. By such mechanisms, the interests of a person in a network are represented in a positive light, at the right time and in the right place (Burt, 1997). All of these are mechanisms that can come into play within clusters. Another effect of bridging groups of otherwise disconnected people, is that it gives the opportunity to broker the flow of information between people from opposite sides of the hole. High diversity of contacts mean that the quality of information benefits are higher, as non-redundant contacts offer information that is additive rather than redundant, structural holes are the gaps between such contacts (Burt 1997). It has also

been found that brokerage across structural holes provide vision of options otherwise unseen (Burt, 2004). Hence, there is an established relation between structural holes, information flow and recognition of opportunities. But what are the effects of this relation?

The effect of brokering on information flows has been stated to impact on the value a manager adds to a firm in terms of the person's ability to coordinate people. Coordination ability depends on ability to identify opportunities to add value within an organization and getting the right people to develop the opportunities (Burt, 1997). We believe that this also applies to the ability to broker on information flows going in and out of the firm.

The relevance to prosperity in clusters is that the coordination ability can be related to entrepreneurship, as entrepreneurship has been argued to be coordination of known resources in a new way (Alvarez & Barney, 2004). In addition, networks who are rich in structural holes, present opportunities for entrepreneurial behavior (Burt, 1997). The relation between good ideas and structural holes has been studied in a longitudinal study of several hundred managers in the supply chain of a large corporation. It was found that good ideas do indeed emerge from the intersection of social worlds, meaning from the intersection between people in different business units (Burt, 1997). We believe that these findings can be expanded to apply to the intersections between different firms in clusters. Thus facilitating points of contact, and expansion of personal networks play an important role in increasing the prosperity of firms in clusters.

3.4.3 The content of social relationships

It can be easy to attribute the positive effects of clusters to structural conditions; that creating contact points between people facilitate sharing of knowledge and cooperation. But as discussed previously, there are reasons to believe that lasting and prosperous relations depend on the content of those relations, not just the structure. Some refer to this as the relational or cognitive dimension of social capital. The relational dimension refers to assets such as trust and trustworthiness, and the cognitive dimension to that of a shared code that facilitates a common understanding of collective goals and proper ways of acting (Thai & Ghoshal, 1998). We also see that social capital can be related to factors such as norms, beliefs and abilities (Adler & Kwon, 2002), and to factors such as shared representations, trust, interpretations and system of meaning among parties (Nahapiet & Ghoshal, 1998).

Trust

Of these, we will first look closer at trust, which has been shown to induce joint efforts (Thai & Ghoshal, 1998), and has been argued to play a role in all types of exchange processes (Adler & Kwon, 2002). The role of trust in an exchange process can be illustrated by looking at an imagined transaction of a hundred dollars between two friends. A friend loans a friend a hundred dollars, without any other guarantee than a history of interaction with that person. This interaction has established a sense of trust in that person. The friend pays back the hundred dollars according to the agreement between the two. The sum of a hundred dollars being exchanged between the two actors still amounts to a hundred dollars. But the feeling of trust has been reassured within both parts of the transaction, therefore it can be said that the social capital shared by the two parties have been enriched (Adler & Kwon, 2002).

It has been seen that high level of trust diminishes the probability of opportunism and reduce the cost for monitoring processes, thus reducing transaction costs as shown in the example above. This role of trust in social capital is used to explain the role of social capital in creating adaptive efficiency and as encouragement to cooperative behavior. And, therefore

explain how social capital facilitates the development of new forms of association and innovation organizations. This makes the concept central to the understanding of institutional dynamics, innovation and value creation (Nahapiet & Ghoshal, 1998). These latter factors can be linked to the description of clusters as vehicles facilitating the diversity of the companies involved (Porter, 1990). Thus, indicating a relation between the content of social capital and the positive effects of clustering.

Norms and solidarity

Norms is another important aspect of the content of social capital. It can be related to what was called “a shared code” earlier in this chapter. We saw that a shared code facilitates a common understanding of collective goals and proper ways of acting (Thai & Ghoshal, 1998). Literature is ambiguous as to the content of norms that enable them to be a motivational source of social capital, but it can be argued that these norms of generalized reciprocity are the same that resolve problems of collective actions and bind communities together (Adler & Kwon, 2002). For instance it has been shown that sharing certain values in a society can be a kind of social capital that benefits the society as a whole (Thai & Ghoshal, 1998). Thus, norms seem to be highly linked with solidarity. The benefit of solidarity is that it can reduce the need for formal control due to encouraging compliance with local rules and customs. In addition, a high degree of solidarity also allows for transmittance of more sensitive and richer information than other networks (Adler & Kwon, 2002).

Transactions which generate social capital are done without the actors knowing neither the time or value of the returned action. Thus, building social capital is associated with a high degree of uncertainty.

The motivation for undergoing these transactions can be explained by trust and norms of generalized reciprocity. Generalized reciprocity means giving something without knowing for sure when and how the action will be returned. Based on the literature reviewed above, we interpret the role of trust, norms and solidarity in generalized reciprocity as following: We preside with an action without knowing the time or size of the return due to trust. And we see

that it is the right thing to do because of norms and solidarity to the other actors and the society.

Ability to understand

As mentioned, shared codes can be related to norms. At the same time it is also related to that of facilitating a common understanding (Thai & Ghoshal, 1998). This can again be related to the ability to take use of the resources embedded in social relations. Because, if there is not a minimum of common understanding you cannot see what you can get out of the resources made available to you from social ties. In addition, you cannot see what resources you have yourself that the other part might benefit from. There has been some argument over the definition of social capital, especially in regard to the inclusion of resources. Some authors state that social capital is the opportunity to connect, not the ability to take use of the connection.

The problem with this argument is that it allows for the existence of extensive social capital that at the same time may be completely useless (Adler & Kwon, 2002). Because, having a large network is not valuable unless the actors really possess capabilities and resources that other actors may access (Berg et al, 2008). We have that:

“The effective transfer of knowledge requires an absorptive capacity to identify, interpret and exploit the new knowledge.” (Boschma, 2005, p.63)

Thus, we choose to include the ability to connect at in our view of the content of social capital. This ability means to be able to establish a common ground with other nodes in the network, and to use this to leverage resources you get access to through the network. We also see that that leveraging of resources is related to the effects of social capital. These effects flow from the information made available to the actor (Adler & Kwon, 2002), in other words, the transfer of knowledge.

Hence, we have identified four elements that may embody the x-factor of social structures in clusters. These are parts of the content of social capital, and are trust, norms, solidarity and the ability to leverage resources that are embedded in the relations. We also see that these cannot be created without a network structure. Therefore the full activation of social capital depends on both the creation of structure and of content, and we will now discuss a framework for the activation of social capital.

3.5 The activation of Social Capital

In our definition of clusters we tied the positive effects of clustering to interaction between firms, and we saw that this interaction can be linked to the formation of social relations. We have also seen that social relations give rise to social capital, which is a form of asset that leverage the use of resources embedded in a network (Adler & Kwon, 2002). This means that social capital eases transactions both of tangible resources such as money, and of intangible resources such as knowledge. Therefore it is reasonable that social capital play a role in explaining the positive effects of clusters. Social capital is comprised of a structural and a content part, and we see that the positive effects of social capital are related to both of these aspects. We will now present a framework for the activation of social capital, which will be used to investigate our research question: *What role do social relations play in the prosperity of clusters?*

The activation framework proposes that in order to take fully advantage of social capital, it must be activated (Adler & Kwon, 2002). Hence, differences in the activation of social capital might explain why some clusters are more well-functioning than others. The framework rests on three factors: opportunity, motivation and ability. The presence of these three factors is viewed as equally important. This is because social ties between actors create the opportunity for building social capital, but for this opportunity to be exploited, motivation and ability must also be present. Therefore we see that

this framework incorporates both the structural and the content part of social capital, it is therefore suited for investigating our sub-research questions:

- What role does the structural part of social relations play in the prosperity of clusters?
- What role does the content of social relations play in the prosperity of clusters?

The opportunity factor will be used to investigate the role of the structural part of social relations. While the motivation and ability factors will be used to investigate the role of the content of social relations. We see that the mechanisms behind the activation of social capital are especially interesting for structured clusters, where they try to replicate the environment of natural clusters. Therefore we propose that the context where the relations are formed has an impact on the success of building social capital. What these factors are will be investigated through our last sub- research question:

- What external factors are important for social relations in clusters?

The framework we will use in our analysis is presented below. It is based on the activation framework proposed by Adler and Kwon (2002) and the literature reviewed above.

3.5.1 Opportunity

Opportunity refers to the possibility to form social ties within a network (Adler & Kwon, 2002). Hence, it applies to the structural part of social capital. External ties can be seen to give actors the possibility to leverage the resources of contacts, (Adler & Kwon, 2002). Hence, facilitating more external ties within a cluster would give more people access to leveraging of more resources. This can be related to leveraging of resources in the form of knowledge from contacts in other firms, or to leveraging of resources made available by the cluster administration, such as access to funding through collaborative projects. Hence, increasing external ties may affect the prosperity of firms in clusters. External ties are here ties to between people in

different firms. We have seen that geographic concentration is a feature of clusters, and the opportunity factor can be tied to this trait. Because, in order to form new network connections, people must get the possibility to meet, meaning that the opportunity to form new ties must be present in space.

But who should get the option to meet? We see that position within a firm can be tied to the opportunity to form new ties (Burt, 1997). This can be exemplified by how for instance a sales manager has other networking possibilities than an engineer working in production. The first will naturally get in contact with a lot more people that are external to the company than the engineer. But the engineer might have better opportunity to form ties within the company. So the opportunity to form network ties is not evenly distributed within a firm. In the same way relations and exchange processes are not evenly distributed within a cluster, which leads to subcultures around focal points (Menzel & Fornahl, 2009). To maximize the outcome of social relations these subcultures should be put in contact so that they get the opportunity to leverage the resources of other groups.

This means that the opportunity to meet should be given to the people that has the potential to connect groups of otherwise unconnected people, which was called bridging of structural holes earlier in this paper. Structural holes are disconnections between non-redundant contacts, and bridging such holes has been shown to improve information flows (Burt, 1997). The effect of information flow is because the network provides access to information beyond what a person could possess alone, and it holds the advantage of providing that information early. But the brokering of this information depends on position in the network, meaning that the possibility to take advantage of the information depend on whom else the person is connected to. Therefore connecting the right people and changes in information flow is related to the opportunity factor. Based on this we make the hypothesis that the opportunity component of the activation framework can be investigated by looking at these factors:

- Space - the possibility to meet physically

- Connecting the right people - importance of position
- Information flow - changes in access to knowledge

3.5.2 Ability

But the presence of opportunity is lost, unless the actors have the ability to take advantage of the resources made available by the network. This capacity is not easily captured, as ability is closely tied to factors residing within each individual. These are factors such as knowledge, capabilities and cognitive abilities, the latter referring to the ability to connect at the cognitive level. This touch into the area of proximities, where it has been argued that access to relevant knowledge is insufficient for creation of new knowledge between heterogeneous agents, because: *“The effective transfer of knowledge requires an absorptive capacity to identify, interpret and exploit the new knowledge.”* (Boschma, 2005, p.63). Investigating cognitive abilities is difficult, so we propose to look at the ability factor by looking for expressions that show lack of ability. These can come in the form of expressing lack of learning from the network, or by expressing difficulties in implementing or interpreting the information made available to you by the network.

- Lack of ability to connect and leverage resources

3.5.3 Motivation

As discussed earlier, transactions which generate social capital are done without the actors knowing neither the time or value of the returned action. Thus, building social capital is associated with a high degree of uncertainty. Trust, norms and solidarity is believed to play an important role in lowering this uncertainty, and hence in the motivation to engage in building social capital.

It has been seen that trust influence all forms of transactions (Adler & Kwon, 2002), also those of information, which makes it of relevance for cooperation within clusters. A high level of trust has also been seen to diminish the

probability of opportunism (Nahapiet & Ghoshal, 1998). These effects of trust as lowering risks can be linked to mutually interdependent networks in clusters. Because when you know that the other part is dependent on you, you have more trust in that part not doing actions that might harm you. Hence, trust can be tied to mutually interdependent networks, a type of networks that has been related to the prosperity of clusters.

Norms also play a role in generalized reciprocity, which means to give something without knowing exactly when and how the action will be returned. Norms can be described as shared codes that facilitate the proper ways of acting (Thai & Ghoshal, 1998). And it can be argued that these norms of generalized reciprocity are the same that resolve problems of collective actions and bind communities together (Adler & Kwon, 2002). Thus, norms influencing motivation seem to be highly linked with solidarity, which means the feeling of belonging to a community. This can again be interpreted as being mutually interdependent, which is as mentioned before, a trait of well-functioning clusters (Rosenfeld, 1997). Based on this we argue that the degree of mutual interdependence influence motivation. And that a high degree of mutual interdependence increases the transmittance of sensitive information (Adler & Kwon, 2002). We therefore propose that the motivational factor can be analyzed by looking at these elements:

- Norms - shared codes that dictate the right way to act within a community
- Solidarity - feeling of belonging to a community
- Trust - lowers the perception of risks

3.5.4 The framework as a whole

In order for social capital to be activated, the three factors must all be present. This is illustrated in figure 1 on the next page; the inner triangle is where all parts overlap, and illustrates the cases where social capital is activated.



Figure 1 Illustration of the Activation Framework

Each factor is represented by a factor, and the area in the middle where all factors overlap represents the activation of social capital.

The necessity of the different parts for the activation of social capital can be illustrated with an example. Imagine an entrepreneur who needs help to make a new prototype, and in his network he has several engineers. Thus, he has the opportunity in the form of network connections. He is also well liked and an integrated part of the community, so his network connections feel motivated to help him due to trust and solidarity. But not all of his contacts are able to understand cognitively what type of help he needs. This means that the ability to truly help is only present in maybe one of his network contacts. The activation of social capital only takes place between him and the contact where all three factors; opportunity, ability and motivation is present.

As the activation framework incorporates both the network and the content part of social capital it is suited for investigating the success of establishing new relations in structured clusters. The network part is reflected in the opportunity element of the framework, and the content part in the ability and motivation part. We have argued that social capital may explain the difference between networks and clusters. A structured cluster tries to replicate these benefits, but even though the existence of clusters make fruitful relationships more likely to develop and become effective, such relationships do not automatically occur in all clusters (Porter, 2000).

In regards to this we propose that the context where the social relations are formed has an impact on the building of social capital. We see that the impact of external factors is not treated in Adler and Kwons (2002) framework; therefore we also seek to expand the understanding of social capital by investigating the role of these external factors.

4. Presentation of empirical context

In this chapter we will present the context of our empirical study. As described in the method chapter we chose the clusters in Horten and Trondheim mainly due to their participation in the Norwegian Centers of Expertise program, and that they were quite similar. We will first present what the Norwegian Centers of Expertise program contains of, and further shortly describe the two clusters; NCE Micro- and Nanotechnology and NCE Instrumentation.

4.1 NCE

The Norwegian Centers of Expertise (here after NCE) is a cluster program initiated and administered by Innovation Norway, The Research Council of Norway and SIVA. The Norwegian government finances the program, as NCE is a governmental incentive to increase innovation, cooperation, competence and internationalization of Norwegian business. The program consists of twelve regional clusters spread around in Norway. NCE was launched in 2006 with the aim to strengthen the innovation and internationalization processes, and particularly to focus on promoting collaboration between firms, R&D, public and the educational sectors. The programs four main goals are increased innovation, targeted internationalization, strengthened host attractiveness and access to tailored expertise. These are all part of an incentive to increase innovation in Norway (NCE, 2014). All clusters that become a part of the program are supported financially and professionally for ten years if they can show that they reach their own internal goals.

The incentive for the program was to strengthen Norway's already established and dynamic clusters, and their long time goal is to become so called "world class clusters". The program intends to support clusters that have the best conditions for further growth (Isaksen, 2009), which implies that the clusters are existing clusters before they apply to be a part of NCE. The clusters are chosen based on evaluations of the cluster dynamics, innovation activity and collaboration, international linkages and quality of projects.

The NCE administration has a contract with the management of the specific clusters such as NCE-Instrumentation. The contract contains specific goals, which the success of the cluster will be measured against (T5). These goals create the background for what activities the cluster management puts in motion. Twice in the ten-year span they have an external evaluation of each of the clusters in the program. Further they report yearly to the NCE administration, in these reports they need to show progress.

4.2 Trondheim

The Norwegian Centers of Expertise Instrumentation (here after Trondheim) cluster in Trondheim has been a cluster since 2006, and was one of the first clusters to be part of the program. The cluster is administered by one person, who is located in proximity to many of the member firms. The cluster has set very specific goals for how they shall facilitate contact and collaboration between their members. These goals are to arrange 50 networking events, 20 workshops and 25 projects. The goal is that these arrangements will result in funding of 5 - 10 projects by the Research Council (T5). The cluster arranges networking events such as breakfast meetings that are open for everyone, also non-members, in order to get the largest, possible network. The workshops are more focused on specific topics, these are also only for cluster members. The goal of these workshops is to generate new activities in the form of projects run by the cluster. Projects are only for cluster members, as this is a way of providing them with added value (T4).

4.3 Horten

Located in Horten is the Norwegian Centers of Expertise Micro- and Nanotechnology cluster (here after Horten). The area around the cluster has a long industry history, expanding from a shipping industry into microtechnology. Further they also have a long, 40 to 50 year tradition for organizing themselves in clusters (H9). They have the MicroTech Innovation,

which is a commercialization program and a cluster facilitator. In addition they have the old cluster, Electronic Coast. Both of these have been semi-merged with the NCE-MNT cluster when it was established in 2006. The cluster contains mainly component suppliers, subsystem suppliers and system suppliers, but very few have the same core market. Similar to Trondheim, Horten has specific projects arranged by the cluster. The topics of these projects range from how to boost recruitment to the Vestfold-area, to the topic of robust electronics. They also involve the surrounding community in a project, in this project ten-year-olds from the area gets the opportunity to work together with the companies in the cluster on building a space rocket.

4.4 How the clusters facilitate networking

One of the main goals of structured clusters is to facilitate for establishment of new connections and to strengthen existing ones. We will now present our findings on how breakfast meetings and projects administered by the cluster affect the creation of networks between the cluster members.

4.4.1 Breakfast meetings

A very specific type of meeting place that both cluster arranges, are breakfast meetings. The aim of these meetings is to encouraging companies to put forth problem areas, and then hopefully the result will be cooperation about solving these problems (T5). The breakfast meetings are arranged in a specific way in order to facilitate networking and dialog. It starts with a presentation with a technical or academic angle, where the presenter is encouraged to also include a challenge. According to the cluster leader in Trondheim, most of the challenges are of the technical type. The challenge can both be a problem that the company has to solve on its own, or it can be a problem that the cluster can cooperate about solving (T5).

The cluster manager in Horten expresses that they do not have a lot of focus on pure networking events, but at the same time states that meeting each

other in both formal and informal settings is the main function behind getting collaboration projects to work.

"The social arenas, without us focusing too much on it, have a main function of creating cooperation projects, and that one meets and gets to know each other in an formal and informal setting. And that these people talk to each other outside the set arrangements and further come up with projects to collaborate on" (Translated by the authors, H10)

Hence, they do not seem to emphasize arranging informal networking areas in the same way in Horten as in Trondheim. This is seen more as a positive side effect of other more formal events. But he also emphasizes that meetings with an informal tone is important. The reason is that he sees new contacts are being made at such events, and that informal talk about topics outside the meeting agenda lead to new ideas.

4.4.3 Projects

Both clusters have one or more large educational institutions such as a university or colleges as members, and we see that these institutions play an important role. They are also both connected to a big research institution, what that is interesting is that we see that the role of these research institutions differ in the two clusters. This role is especially linked to projects run by the cluster.

In Trondheim the research institution SINTEF takes an active part in facilitating cooperation by taking the lead on creating projects. There are dedicated project leaders from SINTEF that cooperates with the member companies about sketching out new ideas. These ideas are then discussed, which results in specific proposals for collaborative projects. It is then applied for findings for these projects (T1). The project leader from the research institution also has the tasks of recruiting and communication (T4). Hence, the

research institution has a lot of impact on how the cluster grows and how it shares information.

In Trondheim the research institution actively drives cooperation projects forwards. T2, a representative for a company that participated in a project called LEAN stated:

“The project was conducted, and we had a lean production project. And it was SINTEF that were the prime mover of the project and looked at it with a longer perspective, not just within production.” (Translated by the authors, T2)

HBV - the research institution in Horten seem to have a bit of a different role. H7, a company representative says this about the situation in Horten:

“We are as small tufts that are busy with our own. And then we have the college that has its own agenda. So there really is no collective drive” (Translated by the authors, H7)

So it seems like the research institutions in Horten does not create the agenda in the cluster the same way as in Trondheim.

One reason for this may be that HBV is smaller than SINTEF in Trondheim. The representative for HBV says that it is usually they who makes the initiative to collaborate with the firms, and that in the beginning they were not taken seriously, opposed to for example NTNU that has a long and great research history (H11). Thus, HBV seem to struggle to be taken serious due to lack of history. This may explain why it does not play the same role as SINTEF in Trondheim. There are indications that this difference in roles is in not purely accidental. For HBV it is important not to become an academic research cluster and maintain relations and collaboration projects with the firms. But they do hear that they are a bit too research driven and ahead with the technology for the firms in the cluster (H11). He also says that it is mainly HBV that takes initiative. And therefore it is important for them to attend

cluster activities such as breakfast meetings. This serves as a way to learn about what that happens and where there may be possibilities for cooperation (H11).

The impression from our findings is that activities arranged by the cluster program do indeed facilitate bonding between people. Hence, the cluster program facilitates the opportunity to form new network bonds. We will now present our findings on how the companies themselves experience the effect of cluster program activities on their opportunity to form new network bonds.

5. Empirical findings

In this part of our thesis we will present our empirical findings. It has been analyzed with respect to the factors in the activation framework, which was presented in the literature chapter. The findings are presented in tables, with a summary of the most prominent points at the end of each table. For simplicity we have included the table below, which include the codes and the position of each interview object.

Table 2 Overview of cases, reduced version

Firm	Code	Position
Noca	T1	COO
Kongsberg Maritime	T2	General manager
Washington Mills	T3	Manager Operational support
Sintef	T4	Research scientist/ Area manager, NCE
NCEI	T5	Cluster manager
Teekay Petrojarl	T6	Director, project services
7Sense	H7	CEO
Sensoror	H8	VP, Sales and marketing
MicroTech innovation	H9	CEO
NCE-MNT	H10	Cluster manager

HBV	H11	Professor
Broentech	H12	CEO

5.1 Findings - Opportunity

As discussed in the presentation of the empirical setting, the cluster program takes aim at facilitating meeting points and new contact arenas in the cluster. These are mainly in the form of breakfast meetings and collaboration projects. The aim of this is for the cluster members to expand their networks, and by doing so hopefully also bridge structural holes. We proposed some factors that can be used to qualitatively evaluate the level of opportunity for forming new connections within a cluster. These are space, which refers directly to the opportunity to form new bonds, connecting the right people and information flow. The findings are presented in tables sorted under these factors and after each table we present an analysis of our findings.

5.1.2 Findings and the analysis of Space, the opportunity to meet

Table 3 Findings of the factor Space

Interview number	Space - success of creating meeting places
T1	Yes, it increases. It definitely does (the network). Because of course, there are many companies that we know from before, but there are also many that we do not know that well, and that we get closer to. We get to know persons and the company in a different arena. That is a lot better than formal meetings where we all present and all that. We get other angles to it. So that is beneficial.
T3	So we attend a lot of these breakfast meetings where there is a nice informal tone. Then we get a bit in touch with other companies, and a bit in touch with SINTEF, and yes, a bit in touch with the NTH environment and etc. And we think that is very nice.

T4	I overhear or talk to people that say that in that breakfast meeting, I met with company X. And afterwards I had a dialog with that company about product development and new contracts. So a lot is happening on the borders of the cluster that it is difficult for us in the cluster administration to document well enough. But we experience and have gotten a lot of feedback saying that it generates new activities for the attending companies.
T4	We have these breakfast meetings at half past eight. People are there very early. People often come at 5 to eight, often before I manage to be there myself. It shows that people appreciates that networking arena. You get to know people and talk to new people. So yes, it almost surprised me.
T4	Oil and gas have managed the mingling part even better. There is something about that room, the corner room make people find their seats very quickly. It almost gets too little interaction ahead of the meeting then.
T4	The motivation to be a part of the cluster can be very different. For some it is a place to meet new customers, but for many it is an arena to learn more. I think the learning part is central
T5	I see that business cards are still exchanged among our company leaders, people that I thought knew each other well already.
T5	Then it is about one hour with presentations, it varies a bit. Then 30 minutes with mingling and follow up. And then it is so that when we started this 3-4 years ago they came 5 to half past nine. So they did not see the value of the initial mingling. They just sat down and listened to the presentation. Now they arrive at five to eight and are waiting for the doors to open: "I talked to Sverre, he is coming today, so we are going to have a little chat."
H10	There is a tendency that there is less people when it is at the research park, than at one of the companies. It is probably because a lot of the events up here is very academic. But at the companies you get a tour, and you get to learn something about each company, and that can be interesting for some of the participants.
H12	It is a bit complex, I do not have the full overview. At least I know that MTI was very early in that project in order to get it financed and established. It is a cooperation between two clusters, and in a way SINTEF at Raufoss that have taken over that project really. And they do have some companies in that cluster, and then there are some companies from NCE MNT cluster as well.
H8	There was (in the US) a lot more contact between people, people were commuting to work, and it was a critical mass of companies. One lunched together and met members in the cluster. Here it is work from 8.30 am to 3.30 pm, then everybody are going home to

	pick up the kids and all that. There are less arenas where you meet. It is the clusters job to facilitate those arenas.
H9	Horten is not that big, but many of the company leaders in Horten, does not live in Horten.
H10	Of course the network building is there. Meeting places are the main function without us focusing on it. This is in order to get cooperation projects where one meet each other both formally and informally, and get to know each other. And then maybe talach other besides what that is the agenda on that event. Then you get up ideas that you can cooperate about.

Analysis of findings on Space – The opportunity to meet

The clusters success in creating meeting places

We found several statements indicating that people had the opinion that networking events such as breakfast meetings worked. We say indications because these statements were mainly about people hearing about or seeing others expand their network, not their own personal experience. The reason for this can for instance be the size of our research population. But we did also find that new connections had been made due to participation in cluster activities. We also did see that the understanding of a possible value from breakfast meetings had evolved over time.

The value of an informal tone

Another finding related to the creation of meeting places in the cluster was that several subjects put emphasis on the value of an informal tone. It was expressed that informal meetings such as breakfast meetings are better than formal in terms of getting new contacts. This was related to how an informal tone made it possible to see the other companies in a new light, which was stated to be prosperous. Breakfast meetings was also said to provide linking to a various set of actors, and in this aspect an informal tone has a positive effect on connecting new people.

Importance of location

Factors regarding the location of events do also seem to have impact on the success of cluster events. It was expresses that another branch of the cluster

has had more success due to location specific details such as how the room is equipped. For instance, if the room has one big table, it is natural to sit far apart. Or if the room is furnished so that people is more inclined towards standing. We also saw that location of networking events impact on participation, if it is at the location of a company it draws more people than if it is at the cluster administration. Another location specific detail that may influence people's opportunity to meet is if people live in the same area or not. In one of the clusters many of the leaders do not live in the region, which must affect their opportunity to meet informally outside of work.

Summary of Space

All the less, we find that structured clusters does facilitate people to meet physically. The success of the aims taken by the cluster administration is affected by the tone and the location of the events.

5.1.3 Findings and analysis of connecting the right people

Table 4 Findings of connecting the right people

Interview number	Success of connecting the right people
T1	It is me and the director that has been the most involved in the cluster cooperation out towards the cluster you can say. In addition we have managed to organize the different activities in the projects internally with regards to what we shall do. It is always a matter of balancing what we should communicate and what we shall do.
T1	Not to any special degree really (information to employees), no more than that it has been talked about the specific project that has been done. It is more about general information, customer and what that is happening and things like that.
T4	It is a problem in SINTEF, NTNU and all of the big organizations. In Statoil as well, there are a lot of experts that have knowledge that is relevant for the cluster. But it is hard to find the right meeting points.
T4	Yes,(tighter connections to the research milieu) because many of the companies sits on a lot of relevant questions, both between the companies and the R&D community at NTNU and HiST. More of the scientist could attend the workshops and breakfasts that are arranged. And in a way suggest some paths for bigger initiatives.
T4	We have done different things. We've had some rounds were we have brainstormed us breakfast area leaders all together. Then we have thought about what companies we want to attend. Other times we have sent emails to those that we know, or CEOs. And we just added some product managers and technology leaders in the database, and then we started by inviting them, then some showed up and found it interesting.
T5	It is challenging to get good contact. Some are very out there and contact seeking and want to engage. Some are in on it in order to get a listening post into something they think is important. And is to a less extent interested in using their own resources.
T5	It depends on the topic (who shows). When Ola Borten Moe attends, then there will probably be CEOs. When there is talk about underwater communications so will probably the technical chiefs or directors or developments manager attend. When we talk about oil and gas in Rio, or oil and gas in Houston, so maybe the market manager will attend. So it varies a bit depending on the topic.

T6	They (who attend the cluster activities) are maybe at manager level, but not director or vice president. So there are very often activities that go on a lower level, and more exchange of information. They are not comments to a strategy, or that to use the cluster, or that one wants some kind of active role in a cluster.
H7	There is a lot of that type of activities, courses and lectures that happens up here (cluster arenas). And here it is possible to meet people. And the ones that attend are mainly people in technology, and then there is likely that they need our services.
H8	I feel that it is hard born, that it takes some extra, and that it has to be done at some sort of manager level. Something has to be done so that you can push it further down in the organizations and create dialog between the companies.
H12	Some interesting things have happened. There was a breakfast meeting where I got in touch with a company in Horten. They do delivery of sky services. I also got a sky service, based on the same platform, expect I use it in another way. So I had a meeting with them afterwards, and talked about possibilities of cooperation. And I got a contact from them, that they thought I should talk to. So I ended up in Lysaker in a meeting with a technical evangelist.

Analysis of findings on connecting the right people

Opportunity only given to a few

We see that there is a mainly a few people in each company that attend cluster activities. These firm representatives then hold the responsibility for connecting the rest of the company to the cluster; hence they serve as bridges between the company and external actors. It means that the way the connections are formed is highly person dependent. It depends on the person's relations within the firm, and ability and interest in forming new contacts with other people in the cluster. The cluster contacts seem to mainly be at manager level, but as the size of the companies varies the meaning of manager does to. One representative from a big company said that even though there are mostly managers that participated from his firm. They are not top-leaders, and hence have no real impact on company strategy. Therefore managers seems to be insufficient, it must be people with real impact in the firm.

Unused potential for multilevel involvement

It seems like the clusters have a big potential in connecting people at different levels in the member firms, but it is expressed that it takes something extra to involve employees at lower level in the companies. There is also especially a potential for connecting more scientist, which could lead to new perspectives on shared problems. It is expressed that the topic of events has an impact on who shows up, and hence who may meet each other. Today a few representatives serve as contact points between the cluster and the firm, which makes the manner of interaction between the firms highly person specific. This means that the interaction depends on the person's inter-firm network, abilities to form new connections and interest in doing so.

5.1.4 Findings and analysis of Information flow

Table 5 Findings of Information flow

Interview number	Information flow
T3	No, that I do not know anything about. I do not. No other than the breakfast meetings I have attended.
T3	Sometimes I send a bulletin to everybody. Because we do tests and different measures within the company, that affects a lot of people. Then it is nice to send out some info, so that they feel that they get some feedback from me. And then if I attended something interesting I can write about it there. I also have a morning meeting every morning, where I can talk warmly about that type of things. Besides that, we do not inform. The thing is to spread the spark, the optimism and the ability to think new. Think a head.
T4	Sometimes we try to forward to the ones we feel might have a specific interest in the theme. But there is no system to it. So if we had some kind of way to be sure scientist would be present, then I am sure that it could create more activity.
T3	What that happens when you enter your own factory is that you get factory-blind. You think a lot of problems and find solutions for them, but then a lot of the solutions already exist. Somebody has already broken the code. And so it matters to get in touch with people with other thoughts and ideas. It is everyday for them, but these are problems that are totally greek for us. It is pretty useful then to get in dialogue with other people in the industry. It is important for us.
T2	Positive (towards clusters), but sometimes one has to ask if he measurable effects are not as big as one might wish for. But at the same time it is important to have the environment that provides information that you can process further.
T1	Yes, two direct competitors are in on that. So, all the projects in the cluster, the meaning is that one should be able to share experiences and findings in the projects and some of the documentation. That is kind of the point. And of course you cannot share to sensitive information both to customers and competitors, but one of our competitors do a specific project now. And they will probably present it in a way that can be shared with everybody.
T5	Yes, that is what we call networking arenas. It can vary from pure social events, to a meeting with some mingling and then a scientific presentation. It can be presentations of each other and what we got as core competence. So that one knows as much as possible about each other. Not just as organizations, but also as people.

H8	Then it can be a lot of engineers and people in production and all that. What can then happen in the things that are going on? And if you sit in production in a company and struggle with production, then you happen to see a history form another company that is very similar to what you are working on. Then you can encourage contact. It is an idea that should not focus and be given notice on, it just happens. There is no one that knows those problems, but themselves.
H8	A lot in those clusters is talk about sharing silent knowledge, a lot of knowledge that many people have, but that does not come forth unless you have a common meeting place.
H8	It has evolved from within, and then there is that one wants new members to join. And in order to get the cluster to grow, the new members must also share the benefits of the community. One must bring stuff in the cluster; you cannot just come and extract business. It is an arena where people can meet and share knowledge. The way I have seen many examples of. It might be knowledge that is self-evident for us, that can serve as big challenges for other companies.
H7	We have a lot of good competence within every company. So we can put money in the pot, and get some international actors to learn us more, instead of 7sens using a lot of money on training two men in the company.
H9	Yes, you do that. Involuntarily. And often most people know each other. In some cases there are newcomers. The interesting is that when you choose a theme, is it often with the motive of other things that it might bring up. And fortunately is it often that companies can do something, when a question is brought up. We did not know that you could do that. We have been buying from America, Germany, France. The result is that companies have to cooperate. And they start doing so. But only to little degree do they give us a pat on the back, because they feel that they figured things out on their own. Because we did not bring them together, they met on their own. So that is the thanks you get for being project leader on projects like that.

Analysis of findings on information flow

A need for better systems for sharing of information

Information flow deals with how the access to information is affected by cluster activities. In the previous section, we saw that cluster contacts serve as bridges between firms and the cluster. Hence, they serve as gatekeepers for information. To diminish this person dependence we found it expressed as necessary to connect people at the right levels within the companies. For instance H8 stated that he believed that only people in production has real day-to-day knowledge about the problems within production. Therefore they are planning on creating a database of employees in the member companies in the NCE-MNT cluster. The purpose of this is to make it easier to share information to people at lower levels within the companies, so that people at all levels in the companies' get an impression of what competencies the other companies holds. The idea is that this will also make it easier to share stories of how one company overcame a challenge, and the hope is that when an employee in another company hears about this, the person will reach out to the first company in order to learn. Thus, the idea is that this database will encourage people at lower levels to reach out to contact people in other companies. And hopefully this contact will result in collaboration around solving problems (H8). It was also expressed a desire for connecting people with different competencies from the representative for the research institution in the NCE-I cluster (T4). He expressed that many of the companies hold a lot of exciting problems, and that these could benefit from getting in touch with researchers connected to the cluster. He further envisioned that more of the researchers from the university and a large research institution in the area could participate more actively on workshops in the cluster. This he hoped could lead to beneficial cooperation. And were the researchers, to a larger degree helped the companies with solving specific problems (H8).

H8 acknowledges the problem of sharing information within the company. He states that it is hard born, and that something has to be done at management level in order to push the information from the cluster further down the organization, and to create dialog between the companies.

SINTEF in Trondheim tries to have a bit more active and goal oriented way of getting the right people to attend the right activities. Such measures are for instance delivery of mail invitations by targeting people with specific interest. Today they share invitations about events with a database of about 20-30 people, but they estimate that there are 2000 people at SINTEF that might have something to contribute to at these events. They try to forward invitations to people they believe may have specific interest in the events, but express that there is not a systematic enough approach to broadening the network.

Summary of information flow

Thus, we find that there are information asymmetries within the cluster, and that the cluster can help diminish those by sharing of knowledge from company to company. Nonetheless, there seem to be a long way to go before such sharing of information happens on its own. Now, it mainly happens within the frames of specific events or projects.

5.2 Findings of ability

In this part the empirical findings that are related to the ability element of the activation framework is presented. As we found little empirical evidence of existing ability, we have searched for the factors that hinder the cognitive connections to evolve, which is what creates ability. The key factors for their lack of ability are presented in the end of the table.

5.2.1 Findings and analysis of the lack of ability

Table 6 Findings of the lack of ability

Interview number	Factors that hinder ability
T1	There is a good culture (in the cluster), many know each other and it is a small industry, and everybody knows of everybody. And the dialog and cooperation in the cluster is good. And when they have projects it is no problems.
T1	But it (cluster activities) becomes very on/off. It is great when one has put off time and resources to work with the cluster. But when one goes back to the everyday business it is hard to take with you the changes.
T1	It is more like a natural hierarchy. The biggest firms have the greatest opportunity to set of more time and resources and have more continuity and be a bigger part of the activities. And have bigger responsibilities. It is like those who are the most active are get the most. To be a part of the cluster one has to be positive, link it to the internal strategy, budget and plan around it. It has to become a bigger part of the firm.
T3	We are about six that take turns in participating in the cluster. Someone has to stay at home and run the store. I feel that we are all very interested. Our local management is very generous with this with getting impulses from the outside. It is easy to get to go to courses and so forth.
T4	E: Do you remember what you did to make them share more? O: No, I think it just was about getting to know each other over time. And through work over time one sees that one has a common interest in becoming better.
T6	I think that on many levels in the company one does not see what role one could have in the cluster. And what one could learn. The company does not feel like part of a bigger unity, one only sees oneself as the firm. Therefore one can not exploit the cluster.
T1	It comes down to the supply chain part, that is the one we have the most focus on and what will be a priority to participate in.
T2	How do you experience the employees endorses the cluster? O: I hear that many of them have no relation to it.
T2	No, I believe that the best thing is to have specific projects were one sees results. As the projects we have had, such as the MARGIN, that involved production and procurement. This project probably made the employees more attentive towards the cluster. But otherwise it competes with everyday deliveries in time and attention.

T6	On many levels in the company there is no reflection about what it means strategically (to be part of the cluster) And then you do not feel that directly related to a specific cluster, because you cannot just say that we operate with FPSO, what does that have to do with the others in the cluster?
T6	To many companies it is a tough next step. Because it is a reorganizing of how one thinks of how to solve the next step. You go from having control to really not having control
T3	We are curious about that (their membership) It costs us 25 000, to our firm that is not a lot of money. But there is an investment through work hours, and that is a cost, and investment. We are not completely sure how it will work out. But we are several that would like to participate. We see that it will give us professional dividend as well as a lot of new contacts. And further that will give great payback back to our firm.
T5	There is about one hour with presentations, it varies a bit. Then 30 minutes with mingling and follow up. When we started this 3-4 years ago they came 5 to half past nine. So they did not see the value of the initial mingling. They just sat down and listened to the presentation. Now they arrive at five to eight and are waiting for the doors to open: "I talked to Sverre, he is coming today, so we are going to have a little chat."
T6	(to be a part of the cluster) The firm had to understand that that is an active strategy to have and one had to understand what it takes, and one had to understand network theory or understand why to participate in the cluster. And what one can achieve by being part of the cluster. Those thoughts have not been present at a strategic level in the firm's leadership.
T6	I have worked in TK in Vancouver for eight years, and been a part of the leadership there. Therefore I know that they have a problem with network theory, and understanding the value of partnerships, and that means that one necessarily is not interested in exploiting it.
H12	I think it is ignorance, you do not know enough about what the others do. If I could communicate my message clearly to everybody, and they would be interested in listening. Then I am pretty sure those people would be more interested.
H7	Some are clever and participate, others need more of a push. For example, I lead a group that works with robust electronics, that is interesting for most. If not their product will be bad. But we cannot find the time to meet. One is so close to one's own company that one cannot participate 100% in the cluster. So it is an on/off thing. Sometimes it is super interesting and then everyone is on, but other times it is boring, and then people are off.
H7	There is a lot of competence in all of the firms (in the cluster) and if we together put money in the pot to get some international

	actors inn, to teach us more instead of my firm using tons of money to train two employees in the company. If we can do it together, that would be great.
H10	One is always pulled between the job and deadlines, and so on. So (the cluster) sometimes is like butter on the bread. It is sort of a long-term thing. One won't be measured the first quarter every year for what you do in the cluster. So it is clear that you (the cluster) need to fight a bit for the time and attention. And it has to be very relevant for the top management to participate. And then fewer than you thought participate and then it becomes like an evil circle. So it is important to push them (the companies) a bit and challenge them so that they understand that if you participate you will gain more.
H7	E: Is there any negative aspects with participating in the cluster? F: It draws resources. If I were to send Gerhart to an event, it will cost me 1000 kr an hour, I can't do that. So that is a problem for us. But I as the CEO have a bit of a different role that makes it possible for me. I hear a lot of the other firms comment on that as well. And that is also the reason that it is hard to participate on a daily basis as well. It takes resources to be part of the cluster.
H10	There is a division between those that have the anchoring in micro and nano technology and those who say that this is interesting, but I cannot relate it to my business. And how can I participate if I do not see the relation and benefits.

Analysis of findings on ability

There is a lack of ability to be all in

The firms' ability to connect seems to be affected by their day-to-day business. We found that many of the subjects we interviewed saw that participating in activities was a good thing. And the subjects themselves seemed to feel that they gained quite a lot of knowledge through interesting topics discussed at the cluster arrangements. Some pointed out that the personal gain was important for themselves as individuals.

One interesting finding was that being part of the cluster does at some point become an on/off thing (T1, H7). One sees that one gains a lot when the time is taken to take part in cluster activities, but in the end everyday business is more important. It was also said that one has to see the long time benefits of the cluster and make cluster participation a part of the firms strategy (T6). As

H7 stated, one is so close the everyday dealing of the company, that one cannot be a 100% active in the cluster; therefore it is a on/off sort of situation. The lack of participation seems to stem from lack of time. In some cases it was expressed a lack of affiliation to the clusters theme, and therefore little interest in using too much resources on their participation (H8). But it also seemed that when the time was taken, they saw the value in participating in the cluster. For instance, this was expressed by people starting to show up early to breakfast meetings (T5, T4).

The employees not participating

The lack of employee participation might stem from the costs for the company in monetary value to send employees to cluster arrangements in work hours. One says that sending an employee from further down the line will cost him as head of the company too much, and therefore is not desirable (H7). T2 sees that projects they have participated in, such as the MARGIN project, which involved their production and procurement departments probably made those departments more aware of the project and of NCE, but the day-to-day deliveries will always come first.

Not seeing that the firm has something to learn

In analyzing the findings on ability we found that there were different levels of interest in what one can learn from participating in the cluster. Some firms do not feel that taking part in the cluster is worth the time or economic consequences. As T6 states: If it is not part of the company's strategy, it will not be done. And to make it as a part of the current strategy one has to understand network theory and one has to understand what the benefits of being part of a cluster are.

Other firms see the value in being able to share the competencies within the cluster to a greater degree than done today. H7 states that there is a valuable opportunity in cooperating between the members in the cluster, together they could collectively educate and increase the competencies of the employees. This could in the long run help keep the competence in the region.

T3s firm rotates who participate and who stays home, and he feels that the others are interested. He also believed that his management was pretty generous regarding requests to gain external impulses. The annual cost of 25 000 NOK, is not a large sum for the company. But as mentioned, it costs the firm in working hours. But this cost can also be seen as an investment. By participating in the cluster, they learn and will be able to connect and expand their network, and thus bring something back to their firm (T3).

Summary of ability

It seems like attending cluster arrangements is an on/off thing. Factors that hinder the development of ability are that everyday business interferes with cluster participation, that employees at multiple levels do not participate, and that there is lack of feeling that one has something to learn from the cluster.

5.3 Findings of motivation

We have now analyzed the findings on activation of opportunity and ability. In the theory chapter we found that transactions which generate social capital are done without the actors knowing neither the time or value of the returned action. Thus, building social capital is associated with a high degree of uncertainty. Trust, norms and solidarity were found to be an important aspect in the motivational part of the framework for the activation of social capital. The findings on each of these factors are presented in tables below, after each table we present a summary of our findings.

5.3.1 Findings and analysis of Trust

Table 7 Findings of the factor of Trust

Interview number	Trust
T1	We got a better dialogue with our customers in this cluster, yes I want to say that. Hard to be specific, but we do experience that some of the customers experience more trust due us working actively in the cluster. And us being concerned with some central issues. So, we are a bit serious on that area. It has its effect, and we feel that. I think that is important for the customer.
T3	Industrial espionage that is the downside of trust. If you show too much trust, someone can use it. Maybe not dishonestly, but to take advantage of it.
T4	And they saw what I think is important in that process. We spent a year on it (the project), and afterwards the four companies got more trust in each other, so that they dared to talk freely. And to share experiences about what they thought was difficult. Like for instance resistance against change within companies. How do you make sure that you get the whole team to dare to try and think new? So after a while, the trust became considerable higher during that year. And I saw that then they got more use of it.
T4	At least I experienced that the actors got more trust in us as a neutral actor in a way. That I think is important, and it is something we are aware of. But when we got activities with a company, then sometimes we do get information about both strategy and numbers that we are very conscious about keeping confidential.
T5	What we were evaluated against was trust building and supportive activities. But so, two company leaders in Trondheim get to know each other. Know what each other's companies make, and see that here there are something that we might connect. Like here there is a little thing and there another thing with some sort of connection. To get there, there are a lot of trust building activities. Deconstruction of distrust, which was what we were measured against.
T5	In order to create the foundation for the cluster, we were measured on cluster developing in the start. The development of the cluster identity, feeling and trust building actions that made people open up so that one could easily start a cooperation with others in the cluster. In order to create something in common that would give value creation. And if you see the cluster life on a time line, then this is the precondition to get specific cooperation.
T5	In principle are those meetings free of press, minutes, statements and stuff like that, because we want the ones that

	attend to be open.
T6	But to many companies it is a difficult second step, because it is a reorganization of how you think you should solve the next step. You go from being in control, to not really being in control.
H7	NDA's, suspicion beyond what you could imagine. We are not there yet.
H8	I feel the climate is good. We can talk openly with everybody. The problem the way I see it is that it is not enough time to work on the cluster

Analysis of the findings on trust

We see that the cluster management in Trondheim have a clear view on its role in creating trust among their members, and that they see it as a key component in getting people to understand what dots to connect. By connecting the dots, they mean getting people to see how they can cooperate and create value.

The cluster provides a stage for building trust

We found statements of companies that have gotten a better dialogue with their customers by being a part of the cluster. This improvement was related to an increase in trust because the company participated in cluster activities, and by doing so they got to show customers that they are serious about certain topics. Much of the same notion was reflected in another subject that linked trustworthiness to being present. He said that by being present on cluster activities he created awareness within possible customers about his company's ability to solve problems. Hence, the clusters role in creating trust can be linked to providing a stage for companies to promote their interests and competencies to customers. The cluster setting gives the companies more credibility than if they were doing the same outside the cluster setting.

Risks of trust

Possible downsides or risk of trust was related to loss of control and being taken advantage of. For instance, a subject said that to participate actively in cluster programs means that companies must take the risk of not being 100%

in control. Another mentioned industrial espionage as a possible risk of too much trust. Loss of control is a decision that must be taken internally in the company, while we saw that the risk of espionage could be lowered by means taken by the cluster administration, but also of the research institution. In one of the clusters the research institution play a very active role and we saw that they were viewed by other actors as a neutral actor because they take very conscious mean to keep sensitive information safe.

Trust takes time to build

We also see that trust takes time to build, it was said to increase when working together over time, and that increases in trust had a positive impact on the outcome of the cooperation. The reason for this was that when trust increases, sharing of information also increases. This was reflected in expressions saying that there was enough trust to talk freely. Or like in one of the clusters, we saw low levels of trust and this was linked to high use of NDAs, which can be said to limit sharing of information. Trust was also seen to play an important role in overcoming challenges such as resistance against changes within the companies, and in engaging the whole team.

Summary of trust

So trust was seen to not just make collaboration easier, it also lead to increased sharing of information and a higher outcome of the collaboration. And the cluster provides a setting for building of that trust.

5.3.2 Findings and analysis of Norms and Solidarity

Table 8 Findings of the factors Norms and Solidarity

Interview number	Solidarity
T1	There is a good culture (in the cluster). Many know each other from before, and it is a tightly knit industry. Everyone knows almost everyone around here. Dialogue and cooperation in the cluster is good. When they run projects there are no problems. But it is very on-off, you know. You feel well when you donate time and resources to it as well. But to take it further in the organization, or to take it further. Then it quickly becomes so that one returns to everyday shores, and do not manage to completely grasp that change.
T1	It is more down to earth here, but still professional. There is something about that. But there is not as full of clichées, it is a bit more to the point. And there is an ok level of tolerance. There are some differences there. It has to do with many areas being like that. If you go even further to the point.
T3	Yes, it seems to be a loose atmosphere. It is easy to get to say something
T4	So I think the culture is good in a way, it is open, and it is easy to get people to say yes.
T4	So it is easy to get people to participate. It is positive and it is fun, and that is what that makes that I as a scientist, for me it is not research to do that type of cluster activities. But it gives me very good industrial contacts, a relevant network.
T1	We think that there are possibilities to play each other good and to think about the bigger picture.
T1	There is built a base of suppliers in the area. And to present this to the big actors and show the competence and services available in the region
T2	K: How do you experience the employees' attitude towards the cluster cooperation? O: I hear a lot of people that do not have a relation to it.
T2	No, I do not think that is accepted at all (to take regional considerations). But I do not really know how you can achieve it. Instead one should work against increasing the competitive strength of the measurable things, instead of having an emotional approach to it.
T3	First, the reason for us applying for membership is that we attended those breakfast meetings, and we feel a bit uncomfortable with that. So we want to pay for participating

	because we think this has that much value for us. On the other side, getting more to say, getting to participate on projects and stuff like that weighs more than just the meetings. And that we want to do. It also gives us as people what we call human capital. So it gives us something personal, and we hope to give that back to the company as good business.
T3	Yes, there is awareness about buying locally. Among others, the service level is high locally, and the time of response is fast. And the worst, in the Orkdal area you can call anyone of our suppliers in the middle of the night, and then they come. Because they know that it is us that make their living. And that is worth a lot.
T4	No it was only a matter of getting to know each other. That through cooperation over time you got a common interest of getting better.
T4	I think that in the region we live in, is NCE-I maybe the only technology cluster that is the formal cluster of any size that it is important to contribute to, because it is important to keep both knowledge and activities within the region. So that is why I think that, both for my own part and for the department I work in, there is important that the department contribute into that role.
T6	You do not feel like a bigger unity (the firm). You see yourself as the business it is, not what suppliers we use, and how they are organized, and how we can use that. So you see yourself a lot, but you lack the capacity to see strategically on the role you have in the network. Therefore you cannot take advantage of the clusters you either participates passively in or actively. Both locally and globally for that matter, it has not been chosen what level you want to play at. Therefore we do not even manage to do that locally.
H7	The one in Kristiansand-Arendal, where they are gathered around oil and offshore. It is a very gathering thing. While micro-nano, that is all kinds of stuff.
H7	Some people are good at showing up, other need more of a pull. For instance. I lead a group that does robust electronics, and it is interesting for most people. Because when you make electronics it has to be robust. And if it is not, the product becomes bad. But your are so close to everyday business in each of our companies, and then you do not manage to give 100% to the cluster cooperation. So it is in by leaps and bounds. So it depends entirely on what you do, sometimes there is a lot of interest, and everyone is "on". Then there is the boring stuff again, and then it is... But it is a good culture; we do a lot of the same as most of the companies. Because it is development of electronics and software. Even though we have different branches, it is the same foundation.
H8	Getting to share those kind of things is good. It is valuable for us that we can make sure someone gets faster to the finish line.

H9	No, Horten is not that big, but many of the company leaders in Horten, does not live in Horten.
H9	The "Jantelov" does apply a bit here, that I feel. I say it as an immigrant to this region, you should not be better than the others. At the same time they kind of sit and protect their own companies and possibilities. It can probably be challenging enough at times; it has created some extra obstacles. In the east it leads to more competition and productivity. Here I feel that it might have a tendency to make you feel less empathy with a company that goes down, and feel more gratitude over it not being your own company. But that can be my impression.
H10	No, we had an external evaluation. That is being run twice during a ten-year period. One after three years, and one after the sixth year. And that we got a good score on five of five factors that measures if you do the right stuff. But the last, that measured feeling of belonging and anchoring among member companies, that we scored a bit low on.
H10	There are a few that says; "but in 2005 we had a bad experience with cooperating with that company". And then one is still a bit there. But the most think open innovation, and what we do here we only have the use of sharing and play each other better. So several of the leaders say it. But of course it is a bit of "Little kings room" (småkongevælde). Some of the top leaders scowl at each other. Many of them have worked together before in another context. They have not always had the best relationship, and that notion is still around. But the ones that are with us on the meeting places are often not afflicted by that. They got another relationship to it. And kind of, from the same company you can get both the leader and deputy. And the attitude to cooperation varies depending on who shows up. There is a lot of personal matters you know, and it probably will be in all such clusters. But here we got an environment that has mostly been spun out of the same point. So you also see it on the academic community that scientist have gotten here from Company X and other big companies.
H10	It has to do with both, that one has not managed to anchor the micro-nanotechnology initiative with some of the companies that were critical. And a part of it has to do with one not being active enough on places for collaboration, so that they feel they have to participate. Maybe such an attitude to cluster cooperation, it is like that they do not get enough in return for their effort. But it also has to do with that; you get back what you put in.
H11	I will describe it as a lot of turbulence. But when it really matters there is very high degree of loyalty in the cluster. Then most support each other in the work that has to be done. We have been through some turbulent periods in the cluster, where there have been problems with cooperation and stuff like that.

Analysis of findings on norms and solidarity

We see that our findings on norms and solidarity are highly intertwined; therefore we choose to preset them as a whole.

“Yes-culture” vs. “What’s in it for me?”

Norms are hard to discover, but we did find indications of how people looked at factors such as openness and attitude to the cluster. In the cluster in Trondheim, there were several statements about it being a “yes-culture”. The norm seemed to be that one says yes when asked to do something. But we also saw that even though the norm is to be open and participate, that does not necessarily lead to one managing to implement results from cluster work into the company.

Variances in solidarity

In the findings on solidarity we found some interesting differences between Trondheim and Horten. In Trondheim there were several expressions of a wish to support each other, and for strengthening others in the community. This was especially expressed by the small and mid-size firms. They saw the cluster as an arena to promote the companies in the region as a whole, for instance by building a supplier base. One of the smaller companies also expressed solidarity to the cluster community through not being comfortable with free riding by not paying for participating in the cluster.

These findings of a high degree of solidarity stand in contrast to what the big companies from the Trondheim cluster expressed. One of them stated that in the end the measurable things matter more than solidarity with local suppliers. The other big company also expressed that they did not see themselves in connection to the other actors in the area. One of the big companies also expressed a lack of anchoring of the cluster program among employees. These statements indicate a low degree of solidarity.

In Horten we found indications of a low degree of solidarity all over. There were expressions showing a lack of a gathering force. This can be linked to

bad personal history between leaders in the companies, as this was said to affect their ability to cooperate today. Another factor that may explain the lower levels of solidarity is that many of the leaders do not live in the region. But we also saw expressions of a want for more sharing of information, with the aim of helping others. That can be seen as an expression of solidarity with other actors.

In sum the main findings on Trondheim showed strong solidarity with the region among the small and mid-size firms. The big firm did not express the same high level of solidarity, but put more emphasis on the measurable things. In Horten there was mainly an expressed a low level of solidarity.

5.4 Empirical findings - external factors

We found that external factors have a big impact on the activation of social capital. We found that the most important factor that had to be present was incentives for the firms. We found that these incentives were created by two main external factors, the market situation for the firms, and to have shared goals and projects. These are presented in the tables below.

5.4.1 Findings and analysis of the market factor

Table 9 Findings of external factors - market

Interview number	Market
T1	It is important (that there is customers in the cluster). We who work with the production of electronics are very close to our customers, so it is primarily a great opportunity to have a good dialog with customers and suppliers that are nearby.
T1	It was a project with us and two other companies. Two of our customers. The project was about effective production and lean production and those things. And that project lead to our participation in NCE.
T1	We found it (the cluster) to be an arena to come in contact with more customers and actors in the area. That was important. And there were also some projects with SINTEF, in 2008 or 2009. I believe that is the reason why we are part of NCE.
T1	Yes, it is something we consider as important. And specifically the dialog out towards the customers and suppliers and those in the same market.
T1	One has to change the strategy, and that takes time (motivation). To go into a cooperation with a competitor takes time to incorporate.
T1	One has to take it for what it is (the cluster). A meeting place to accomplish good dialog. And it is clear that it is always good to talk to our customers primarily. And also other things that are happening. And then it might be that it later springs out into more dialog and after a while opportunities and things to look at.
T2	Quite a few of the firms that joined in the beginning quit their membership for different reasons. So then there became a little too few participants for it (the cluster) to be effective. So by changing the focus and get companies that were not

	specifically instrumentation to join, and focus on offshore there has been a resurgence of interest from several of the participants.
T2	I believe that it applies to all of NCE that it is easier to gain cooperation if you have a bigger part of the value chain represented. In the start there was mainly instrumentation firms represented, with the exception of NOCA. They (NOCA) where not that interested in having more competition in the cluster, and the instrumentation firms were mainly on the same level but had different markets. And that might be an advantage, because there is little rivalization. But at the same time the challenges are different and it does not give very good basis for cooperation.
T2	What we really miss are big customers. We have Statoil. But in Bergen for example there are many strong customers like Hydro.
T2	The reach towards offshore that has been initiated has done that they have a greater part of the value chain in the cluster. Among them the larger oil and gas companies.
T2	We tried to gain more customers in the supplier part of the cluster, and would like some consultant services. But there we have not succeeded very well. But it is getting better.
T2	It is very varied with who is motivated to cooperate with the competition. Some firms are very withdrawn, and resigned because they did not want to share information. There was two rivaling firms that were very passive. One of them has resigned and the other is still passive. But where one is not directly competition I believe we work well together.
T2	When one is not in the same marked with competing products and that the product is far from a finished product makes it easier to collaborate.
T2	There are few specific result in increased turnover in the cluster. I have looked at NCE subsea in Bergen and to me it looks as if they have succeeded better and that might be because of the large customer companies that pull the cluster forward.
T3	Very poorly (using the local suppliers). Vi buy services directly, buy equipment directly and have some service deals and so forth, but I feel that we are not very clever at developing together with our suppliers. We really are not very good at developing together with our customers either. That is really a quite dangerous situation, because you really want to be tied to your customers and develop together with them. If you have that trust it is not that easy to change supplier.
T3	We have no competition in cluster, so that will not be a problem.

T6	Not necessarily the network in Trondheim, but with time one might must (be a part of a network) But as long as you can live great and be egocentric, and you have made it by not being part of networks, but the day this changes, and we do not get any new customers, or projects, then it will be natural to go out and find something. To come to that point the organization has been lulled into a thought that you do not need to be active. Because your strategy is to short term. But then the mother company has no incentive to keep the network in Norway.
T6	It is wrong to say that we do not want the resources (in the cluster) but we are more interested in where our customer is, and to meet them with our solutions. And we can do some development if they have a specific problem. But it is not something we prioritize.
T6	What we really are trying to achieve all the time (new customers) Why do we sponsor that network, why do we participate, why do I go to a meeting, why do I call Tore every Thursday and why do I try to stay in touch? It is because within that network we are working with eks the development of Johan Kaspers and when it is going to be built we want it to be with a FPSO solution, not with our competitors.
T1	Trondheim is not that big, one knows people from different places. And one meets people again. The CTO of Kongsberg Maritime is my neighbor. So one knows of people. And one meets in different arenas as well.
T3	Now we are in a position that gives us the opportunity to be a part of these things. When the market is great, we need to operate the store. But now is the time to develop if we do not we will go bankrupt. And that is just a question of time if one does not develop.
T3	Yes, I believe that that is a knowledge everybody in the industry has. One has to evolve, and that has to be done in phases. If the store is great, one has to feed the cow in the barn, but if the cow gets old one has to find something new.
H7	As a consultancy firm one has a lot of incentive (to be part of the cluster). I have a relation to the incubator and therefore many of the startup companies. I talk to everybody all the time to be sure to be the first they think of when they need something, like help, so that is one reason for participating in the cluster. The other is to gain more knowledge for myself. What are the technology trends, what is happening and what will happen? It is much better to be in it, than to sit on the sideline.
H7	The active membership came with me. When I came to the firm, the firm was not a part of the cluster, and he who was CEO did not see the benefits at all. I see it totally different. For

	<p>me, who talks to everybody, it is here (in the cluster) all our customer are. Even though everybody is not here at the same time. But if you take marketing, if I use 10 - 15000 kr on ads in a relevant magazine once. What does that help? Maybe somebody notices the logo. But if I am here, use one hour a week, everybody knows in a very short time. And that happened. Everybody here knows who we are. So the marketing part of being part of a cluster is fantastic! And through the cluster there is a lot of activities. Like courses and lectures. And those who are here are into technology, and then they most likely will need us (the firm) from time to time.</p>
H7	<p>I am in a very different situation than the other firms in the cluster. I really want to collaborate, because that is what gives me customers. The cluster is like honey jars, it is just to walk around and be available. But the cluster can not be active just for me. Cluster cooperation is more than working for each other and delivering equipment. It is also to attract new employees.</p>
H8	<p>One are members of the cluster because one sees the value. It is not possible to design and establish a cluster. The cluster must exist because there is a will for it to be there. And that it is there because it is important for the firms and there is a will for the cluster to be there that comes from the inside. And it's force is that it is useful for the firms, local and close. And that there is relations across the firms, customers and suppliers.</p>
H8	<p>Mainly all of our customer are outside of Norway. And that seems to be in common for most of the firms down here (Horten) That makes it so that there is little competition between the firms in the cluster. That might be the key to that it is easier to share information.</p>
H7	<p>Personal relations are extremely important. And at the same time it is about building credibility. When you meet someone, and say the right things and show that your firm can solve the tasks. You will be the one that they call if they need something.</p>

Analysis of the market factor

If the market is great, why bother?

In the market category of our findings we found that if the companies felt that they did well, or the market was thriving the firms had little incentive to join the cluster. This seems to have something to do with not feeling the need for support and network when the times are good.

As one subject stated: *“When the market is great, we need to tend to business”* (translated by the authors, T3). And another subject pointed out that as long as our customers are happy, we are happy. T6 is part of a relatively stable and conservative industry, and they have no desire to integrate cluster participation into their strategy, as they see no need for it. They tend to go where the customer wants them to go, and the customers do not demand innovative solutions, they want what is stable and safe (T6). On the other hand, it seemed that if the market was in decline, and times were bad, that was an incentive to join the cluster. The day there is no new business or contracts, or your competitors have better solutions than you do, then you might feel that being part of a larger network can be useful (T6). So as long as the firm thrives from being selfish and thinking of oneself, and being successful without being part of the network, one will not wish to spend the time and money on cluster activities. As one subject stated, everyone in the industry knows that you have to innovate and go further, and that there are different phases in the market cycle. Therefore when the times are good, it is time to focus on that, however, when the times are bad, then you have to search for new impulses (T3).

Value chain

We also found that one of the core reasons for joining or participating in the cluster seemed to be the firm’s value chain. And as one subject stated: The core reason for being part of a cluster and building network is the customer (T6). And part of the force of the cluster was that it had relations between customers and suppliers (T2). Some of the interviewed firms became a part of the cluster due to customers and the opportunity to get in contact with them. Another subject said that his firm benefitted so much from being a part of the cluster, because the cluster was like a collection of honey pots to go and collect from (H7). One firm mentioned that not having competitors in the cluster might influence their trust in each other in a positive way (H8). The one firm we found that actually has a competitor in the cluster seemed not to let that affect their relation to the cluster. Several of the interview subjects also mentioned the NCE Subsea cluster in Bergen as a model to replicate, because of their big customers that give more incentives.

5.4.2 The findings and analyzing of shared goals

Table 10 Findings of shared goals

Interview number	Shared goals
T1	Yes, projects are financed through applications to for example The Research Council, which we write together. The firm itself does not get any of the funding
T1	It is more like a natural hierarchy. The biggest got the possibility to donate more resources, and a bit more continuity. And in a way contribute to the activities to a larger extent. And they can take more responsibility. The most active ones, also gets the most out of it. One has to stay positive to what is going on, and specifically relate it to internal strategy, budget it and plan it. And become a larger part or our business.
T2	I knew the guy who took the initiative. And further we got an invitation to the instrumentation cluster in Trondheim that the city ran in the late 90s. That cluster was administered by early associates from SINTEF. Therefor I knew about the initiative then. Those same people were part of the startup of the NCE cluster.
T2	The motivation for the cluster is very dependent on an enthusiast.
T2	There are many things that one has to take into consideration, that it is hard to put into numbers. Through the project we hoped to be able to put numbers on those things.
T2	One gets a reimbursement as the project leader. But otherwise one covers one's own effort. And then the value needs to be that you gain more than the time you spend.
T2	Generally I was very motivated because I believed in the concept of clusters, and because I have seen that it has been effective in several milieus. For example the one in Sunnmøre, both in furniture and maritime. So I had faith in the concept of clusters and the way of stimulating industry and to stimulate this through the NCE program might make the stimulation happen faster than if the cluster grows naturally.
T3	We were introduced to NCEI via, via. There was somebody from the firm who had attended before and then we were invited through an email that was already filled out. For us the instrumentation part is on the side, because we who are seeking membership are mainly the operation employees. We are more interested in the supply chain part of the cluster.
T3	We jumped to the opportunity and attend many of these breakfast meetings. There we find that there is a very informal tone and one comes in contact with other firms, SINTEF and

	NTNU. And that we find very great.
T4	The motivation to be a part of the cluster can be very different. For some it is a place to meet new customers, but for many it is an arena to learn more. I think the learning part is central.
T4	It (the cluster) needs researchers, or individuals who sees the value of it. And sees that there are other interesting firms and relevant issues being discussed for everybody. For this to happen I believe NCEI as a brand is to little known. There are few that know of NCE, both in Trondheim and elsewhere outside a small core that knows what we are and who we are. We could have a clearer profile and brand and through that made more people from the FOU milieu to attend and think that this was something they should be a part of.
T4	Yes, we have lost some. There were two that resigned last year. Of those who I know, they felt that they had received a little too little follow-up. They did not feel that they did not get that much from what was going on in the cluster. They had hoped to gain more back up from us. I felt that that was a pity. But there are more that signs up than signs out.
T5	We had a project were 6-10 firms participated and gave the impression that this was important. We did the pre-research and I could have started a project, but then it stopped. We did not get the commitment from the firms. So the project stopped, but all had gotten an elevation of expertise.
T5	To gain great contact is challenging. Some are very out there and contact seeking, and want to get involved. Some are more in the cluster to have an ear in something they think is important and are therefore less interested in using their own resources.
T6	We have different levels in the firm that understands or do not understand that to be a part of a cluster. And then there is the choice of exploiting the possibilities and have a strategy around those. And as of now, we do not deliberately use those resources.
T6	So you know that there are employees from TK who attend those breakfast meetings? B: Yes. E: Is it to be up to date? B: Yes, inside their field.
T6	We are not innovative on the technology side, but on the financial side. That is where we are very great. And that is also where we have chosen to focus and build our network. That is because our field is not that interested in technology. It just has to work.
H7	It is probably is dependent on personality (why the last CEO was not interested in the cluster). I like to talk to everybody. When I started here 3 years ago, I had no contacts. I had worked internationally. But I have done a lot. And you have to have an attitude that one has to talk to people to get information.

H7	I can say that it is important to use the time, and participate in the cluster. But there is no point in me saying that. One must understand that. They must participate and see it (the value of the cluster network) for themselves.
H7	One cannot just tell people to show. The cluster has to be attractive for people to show. And then has to make itself attractive. And that is what we are doing now, with courses and activities and so on. The cluster needs to be interesting in itself.
H8	The management has to understand that they have to invest their time in order to get something out of cluster activities. In order for the employees to feel that they do not skip work when they attend a breakfast meeting or a seminar that is not a 100% related to their job, but because they see the value in them developing their contacts.
H8	The problem is the way I feel it, that there is not enough time to start working on the cluster.
H9	But it is probably difficult to make network meetings only for the network, because there are so many different companies and markets and they have so much to do. It is difficult to defend to allocate time to do it. Then you have to create a pull, for instance by having special presenters, or specifically good food, or a specific issue that you know they are interested in.
H11	E: Would you say that your membership is adapted to the clusters needs? P: Yes, yes! We get quite a bit of financial support from the cluster. This year we have received 1,4 mill, in a budget of 12-13 million, which is quite a significant contribution.

Analysis of findings on the factor shared goals

Specific projects create incentives

The incentive to participate seems to be different from company to company. One incentive can be that the companies want to be inspired and learn things within their field. One subject, that had newly joined the cluster officially, mentioned that the membership in NCE Instrumentation was not really because of instrumentation being part of their core company competence. Their participation was rather connected to an interest in the supply chain part of the cluster. They saw the need for a more efficient way of conducting production, and therefore wanted to learn more about it through their membership (T3). To be able to broaden their horizon, see what is new and

increase the companies' competencies was another firm's incentive to participate (H7).

As mentioned above, T1 believes that his company became an active part of the cluster because they saw that there was a collection of their customers and other industry actors. They saw it as an arena for getting new contacts. In Trondheim one project had four different companies participating, where the larger one mainly participated because of the sufficient way of gaining insight in the numbers, and costs of production abroad (T2). Conducting this research alone would be extremely costly and time consuming (T2). The project had just ended as we carried out our interviews. As mentioned in the context chapter, Horten also has common projects such as project spaceship, which are more to connect to the local milieu.

One participates in the cluster to gain something and because one sees the value (H8). The cluster has to grow where there is a will from the companies to have a cluster, and that will comes, if the companies feel that the cluster is useful for them. And relations are needed in order to win from being a part of a cluster (H8). In addition, cluster participation has to be linked to the companies' internal strategy to gain the most from participation (T1) In Horten there is no incentive to arrange network meetings just for the sake of networking, the firms in the cluster are to spread out in market, interest and projects. But to entice with special speakers at meetings, or issues that might interest or a celebratory occasion is often regarded as a way to get the companies to join (H9). It looks like participation is tightly tied to one main person that has been the internal drive in the firm for the cluster. T4 also mentioned that it would be positive for the cluster if NCE gained a stronger brand name, so that to be a part of a NCE cluster was a sign of quality, and it could have a further reach.

The cluster can create a common incentive, or force companies to collaborate within the cluster program. By for example directing financial incentives through for instance the research institutions. The companies pay an annual fee for membership, but it is for example SINTEF that takes the cost of

applying for funding and so forth (T1). The research milieu in Horten stated that in their budget, the 1, 4 million kroner the cluster supports them with is very important to them, and therefore an incentive to participate.

6. Discussion

In this part of our thesis we will discuss our findings in the light of the literature reviewed earlier in the paper, and with the aim of answering our research question: What role do social relations play in the prosperity of clusters? The discussion is divided in three sections according to our sub-research questions:

- What role does the structural part of social relations play in the prosperity of clusters?
- What role does the content of social relations play in the prosperity of clusters?
- What external factors are important for social relations in clusters?

First we will discuss our findings with regards to the role of network structure and then to that of the content of social relations. Then we will discuss how external factors related to market, shared goals and time create a context for the formation of social bonds within clusters. Based on this, we propose an expansion of the activation framework where we include the influence from external factors.

6.1 Opportunity and the role of network structure

In the literature review we saw that facilitating points of contact and expansion of personal networks can be tied to the emergence of good ideas. Thus, having a network rich in contacts can be tied to the prosperity of firms in clusters. We also saw that the opportunity factor in the activation framework refers to the possibility to form social ties within a network (Adler and Kwon, 2002). Hence it captures the structural part of building social capital. The opportunity factor was split in the factors space, connecting the right people and information flow. Our findings on each of these factors form the basis for our discussion on what role the structure of social relations play in the prosperity of clusters.

Space

We do know that geographical concentration is a well-known trait of clusters (Porter, 1990), and that bringing people together by short distances favors the formation of contacts. This again facilitates the exchange of tacit knowledge (Boschma, 2005). What we have seen is that the cluster administration facilitates networking mainly by arranging breakfast meetings and collaborative projects, which can be seen as shortening the physical distance between people. As predicted by the literature review, our findings indicate that breakfast meetings and collaborative projects do give people in the cluster an increased opportunity to form new contacts.

But we also found that bringing people together was not enough in itself. There are other factors as well, that affect the level of success on creating meeting places for networking. The two most prominent in our findings was the value of an informal tone, and properties regarding the location. Subjects both in Trondheim and Horten emphasized that an informal tone was beneficial. Another factor that was brought up was those regarding the location. We saw that the site of the event and aspects of the room where the event is held has an impact on attendance and on success of mingling. In Horten we saw that there were more interest in attending events arranged at the firms' locations and in Trondheim factors such as placement of table and chairs was said to affect mingling (T4). The influences of an informal tone and of the room are factors that we had not directly anticipated in the literature review, but we believe these finding have important practical implications for the cluster administration.

Connecting the right people and information flow

Our findings indicate that the clusters we looked at have an unused potential for connecting the right people. One example is that the cluster administration knows that there are researchers connected to SINTEF and NTNU, in fields of interest for the cluster, which never hears of their opportunities to connect with the cluster (T4). We believe this is because of the way the network structure is built today. Only a few people from each firm work as cluster contacts,

meaning that they are the only ones that get the opportunity to form new network ties. We see that they should work as bridges over structural holes. In this setting, structural holes are disconnections between the firm and the rest of the cluster. According to the literature this should give these cluster contacts certain advantages in the form of information benefits (Burt 1997).

The way the connections are done today, all of these benefits are given to the cluster contacts. In the presentation of the activation framework we said that heterogeneous groups must be put in contact in order to get the opportunity to leverage the resources of other groups. But we see that the benefits of bridging structural holes fall mainly to the cluster contacts. This makes the interaction between the firm and the cluster highly person specific. In the long run this is not sustainable. And we think that in the case of benefitting from networks within clusters, the firm has more to gain from giving the opportunity to more people in the firm.

A need for multilevel involvement

We see that it varies how the cluster contacts pass the information from the cluster on to people within the firm. There were none in our cases that had a system for information flow from the cluster into the firms, meaning that as mentioned above, the benefits of information is mainly given to one person in the firm. We believe that a result of this is that the network does not get the full advantage of the competencies in each firm. Hence, there is a need for contacts at multiple levels within the firm.

The reason for this can be shown by an example: Imagine that an engineer in production faces problems that are not big enough for discussing with the manager. An engineer in another company in the cluster could very well know the solution to this problem. But as we have stated, none of these employees at lower levels participate in the cluster activities. Hence, they never meet. And because these problems are not of a nature that they would be discussed with their managers, the managers never know about them. We see that if the engineers had a natural meeting place, they would gain a better knowledge about what competencies others in the cluster had. And they could find a

common interest in discussing also the small problems, and solving them. We saw that Porter (1990) described the well-functioning cluster as a vehicle that helps the firms to maintain diversity and overcome the inward focus. We propose that it is the sum of solving these seemingly insignificant problems that create the prosperity of the firms in well-functioning cluster. And therefore it is important to give people at all levels in firms the opportunity to form network bonds, not just top- or mid- level managers as today. We suggest that multilevel involvement would be an important step towards creating truly interdependent networks, which affect the prosperity of firms in the cluster.

Network structure - important, but not key

We see that people in structured clusters do connect when given the opportunity. But, we see that it does not benefit the firm that only a few people serve as cluster contacts. The information is not passed on, and therefore the knowledge created by the cluster network is not taken full advantage of. Because of this, we suggest that to achieve the vibrant, prosperous networks of natural clusters one must involve people at multiple levels in the firms. In addition, we see that traits of the persons involved in the relations affect the outcome. This touches into the areas of abilities and motivation, hence the content of social relations. Thus, we see that the network structure alone is not enough to explain the prosperity of well-functioning clusters. Therefore we will now discuss our findings on the role of network content.

6.2 The role of network content

In the literature review we argued that there might have been put too much emphasis on creating contact points between people in order to facilitate sharing of knowledge and cooperation. Therefore we found that there are reasons to believe that lasting and prosperous relations depend on the content of those relations, not just the structure. We have also seen that the ability and motivation factors in the activation framework capture the content of social capital. Thus, our findings on ability and motivation will now be used

as basis for discussing the role of network content in the prosperity of clusters.

Ability

Variances in the ability to see that there is something to learn

As written in the theory chapter, the ability to activate social capital is closely knit to factors residing within each individual. These are factors such as knowledge, capabilities and cognitive abilities, thus it is necessary to share a certain degree of understanding in order to gain from social relations. As Boschma (2005) puts it, in order to take advantage of knowledge, the agents involved needs to be able to identify, interpret and exploit the knowledge they are presented.

In our research we see that many of the subjects interviewed, expresses understanding of the potential value of interaction with others in the cluster, and that they gained new knowledge from discussing topics at such events. So the understanding of having something to learn from the cluster seems to be present, but our cases indicate that this is limited to the persons that are in direct contact with the cluster. There seems to be a lack of ability to fully interpret and exploiting the knowledge gained within other people in the firms. This is reflected in statements saying that the employees have little interest in the cluster, and that their employees do not feel like they have something to learn from the cluster. We see that this low degree of ability to see what they can gain from the cluster network, cause the activation of social capital to be low. And therefore the social relations created by the cluster do not play out the role it could have.

Factors that hinder ability

We see several factors that hinder ability to develop. The main problem seems to be that the participation in the cluster is an on/off thing. Cluster activities seem to be a secondary priority, which the firm and its representatives do as an extra thing. Because, as almost all our subjects has stated, the day to day business of one's firm is much more important.

Therefore the cluster becomes an on/off thing (T1, H7). Our impression is that this may be due to people not realizing what the cluster can contribute with and the benefits of actively participating.

In our cases the subjects have been mostly positive to the cluster program, because they have heard a lot of positive facts about clusters.

“It is important to attend, to be positive about what is happening and specifically linking it to internal strategy budget and schedule. Then it becomes a bigger part of our business” (translated by the authors, T1).

So they send a few representatives to attend cluster activities, and they get new contacts. But they do not seem to have reached a point where they manage to implement results from the cluster activities into the everyday business of the firms. We think that due to this lack of implementation and lack of specific results, the rest of the company remain unaware of the possible benefits from cluster work. Hence, a large part of the network within the cluster does not have the necessary ability for activation of social capital.

As we have seen tending to cluster related matters seems to be an on/off thing. Therefore it is hard to create sustainable cognitive connections. We see that being able to connect cognitively is an important factor in increasing the outcome of collaborations and the network in the cluster. Because of this, the benefits of being part of a structured cluster might never reach the level it could, when the ability is not present.

Motivation

Trust lowers the risk

The motivation factor is the other aspect of the activation framework that reflects the content of social relations. In our literature review we saw that trust is a very important part of this, because trust lowers the risk related to transactions. In both clusters we found statements saying that participating in

cluster activities increased the trust in the other actors. One case meant that this was especially towards customers; the cluster setting helped them show customers that they were serious (T1). The cluster activities that created trust may lower the risk a customer feels about buying from a supplier, because of the network that surrounds them. This can be explained by how high level of trust diminishes the probability of opportunism (Nahapiet & Ghoshal, 1998). Thus, an increase in trust can help explain why building social relations may lower the perceived risk of transactions between cluster members.

When dealing with the risk of too much trust, our findings from the two clusters differ. In Horten it was stated that there was a frequent use of NDA's because of distrust (H7). In Trondheim however, the risk was perceived as low. This risk assessment can be explained by them not sharing finished products or plans, but rather early stage research results and so on (T1). It can also be connected to a higher level of interaction on social terms, as for example being neighbors (T1). This is because meeting in other arenas can affect their perception of the other actors in the cluster.

Trust increases collaboration and sharing of information

We found that increased levels of trust made collaboration easier. It leads to increased sharing of information and a higher outcome of collaborative projects (T4), which means that it can be said to induce joint effort. This we find to be as predicted in the literature review. We believe that the reason for this is that increased trust lowers your perceived risk of being taken advantage of. Therefore you are more inclined to share more information.

We also saw that the level of trust increased over time. Findings indicated that trust takes time to build; one must participate in cluster activities over time before changes in trust can impact specific results. We see this in the light of findings on opportunity, saying that having enough time influence the opportunity to form new connections. It seems like it not only affect the structural part of social relations, but also the content part.

Norms and solidarity

In our analysis we saw that norms and solidarity seem to be highly intertwined. Therefore we will discuss the findings on these aspects as a whole. Norms can be described as shared codes explaining the proper way to act within a community (Thai & Ghoshal, 1998). And can be seen as important factors in explaining how communities can act together to solve problems, and are therefore related to solidarity.

Norms and solidarity are not easy to detect, but what we did find in our study, is a difference in the attitude towards participating in the cluster. In Trondheim they were very open and positive towards participating, but in Horten there seemed to be less will to participate without knowing exactly what to gain. We think that this shows differences in the attitude towards contributing to the cluster community, which can be interpreted as differences in norms and solidarity.

But the interesting thing is that even though they expressed that it was a “yes-culture” in Trondheim, we did not find indications of the companies in Trondheim being better at implementing results from cluster activities into the company. Thus, it seems like the shared norm of being positive to participate has not had any real impact on the result of outcome on collaboration. We therefore suggest that a shared norm of being open and wanting to participate does not necessarily cause social relations to actually affect specific results.

However, in Horten we did find indications of how a low level of solidarity could affect the outcome of interaction between firms. It was said that bad personal history between some of the top leaders affected their attitude towards interacting with each other today (H10). And that if a company in the region toppled down, people were more inclined towards thinking “thank god, it was not my company”, than feeling the loss of a piece of the cluster (H9). Hence, we see that former history is an aspect in the content of relations. It also seems to affect the level of cooperation and support you show towards each other. When a cluster can be defined as a concentration of firms that prosper because of their interaction (Padmore & Gibson, 1998), it seems clear

that elements such as bad history and low solidarity can hinder the evolution of prosperous cluster interactions.

Trust and the ability to connect - eases collaboration

In sum, our findings indicate that the content of social relations play an important role in facilitating transactions and making collaboration easier. This can be linked to high levels of trust and an ability to connect at the cognitive level. Trust lead to increased sharing of information and therefore a higher outcome of the collaboration. Ability on the other hand affects what one gains from the interaction. The cluster provides a setting for building of those factors. We also see that the effect of norms and solidarity are difficult to coin. But it seems like they can play a role in lowering barriers for interaction by for instance creating a “yes-culture” as in Trondheim, and that they can increase barriers when solidarity is low as in Horten. Through our research we have not been able to find the direct link between norms and solidarity, and how they affect the prosperity of firms in the cluster. We believe that this is because we have not followed our cases over a long enough amount of time.

6.3 External factors - Market, shared goals and time

In the presentation of the activation framework we proposed that the context must be taken in consideration when looking at the formation of social relations. This is especially important for structured clusters, where they try to replicate the prosperous relations you find in natural clusters. The impact of external factors is not treated in Adler and Kwons (2002) framework, therefore one of the goals with this paper was to investigating the role of external factors in forming social capital.

We found that external factors create a context that must be taken in consideration when trying to create social capital in structured clusters. And we suggest that these findings can be split in three main factors. These are time, shared goals and market. Below we will discuss our findings on each of

these aspects, which result in an extended version of the activation framework.

6.3.1 Market - When the market is good, why bother?

In the end, all clusters are really about creating business, and one of the most important elements of business is the market. The market creates a context of which the firm needs to take into consideration. What we found is that if the market is great, why bother? Our research shows that when the market is great, it seems pointless to use time and resources on cluster activities. As one stated, when the market is great, we have to tend to business (T3). The same firm had also joined the cluster because they saw that it was time to reinvent themselves through more efficient production due to downfall in business. Another firm stated that since their industry was so conservative they had no incentive to participate or integrate cluster membership into their strategy. So there are clear indications that the market that surrounds the firm influences their cluster participation. It means that the market affects the activation of motivation of the company. The firm is selfish and does not wish to spend the time and money on the cluster. Because when times are good the companies have enough with focusing on just delivering to their customers, hence they think only of themselves. They do not feel motivated to participate in the cluster by a feeling of solidarity. And as they do not participate, they do not gain the opportunity or ability. On the other hand, when the market is in downfall, they tend to feel a higher level of solidarity towards others in the region. Hence, then they seem more motivated to participate in the cluster.

The importance of value chain

There was especially one factor related to the firms market, that we found had a special impact on the firms' motivation to participate. This seemed to be the firms' position in the value chain of the cluster. If they for example had customers in the cluster, they seemed more likely to be active in the cluster.

“I really want to collaborate, because that is what gives me customers. The cluster is like honey jars, it is just to walk around and be available.”
(Translated by the authors, H7)

And several of the interview subjects indicated that having large customers in the cluster would influence their participation in the cluster.

We found that the firms core market affected how active they felt they should be. In Horten most of the firms have different markets, such as medicine and aerospace (H9). And that caused them not to participate because they felt the cluster was not related to them. It was even suggested that some of the firms lacked interest because they did not feel that the nanotechnology side of the cluster regarded them (H10). In Trondheim however, the fact that they were in mainly the same industry seemed to have an impact on their attitude towards the cluster.

As we have seen, for firms to share and tie social relations, they need to have some core interest in common. We hereby indicate that the market has a big influence on what this core interest can be. Due to this, the market situation impacts how social relations are formed in a cluster. We therefore suggest that the market should be integrated in the activation framework as the outermost factor defining the context for the activation of social capital. This is illustrated in figure 2 below. Further we suggest two more factors for the context, which is creating shared goals and time; these will be discussed in the following sections.

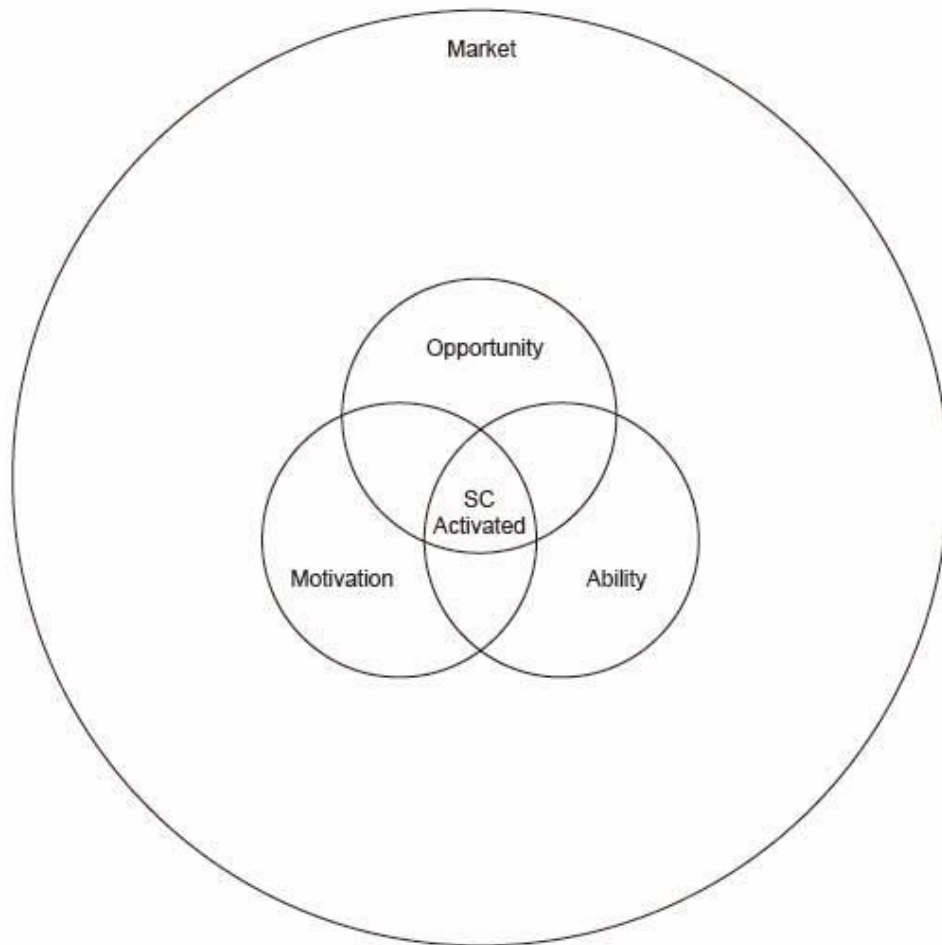


Figure 2: The activation framework extended with the market factor.

The inner rings represent the factors opportunity, motivation and ability, which are all needed for the activation of social capital. The outer ring shows that social capital is formed within a context, and that the market defines this context.

6.3.2 Creating shared incentives

We have discussed that the market is the most important external factor, but next we saw that when the market incentive was in place, most of the companies had additional reasons for participation. We found that these reasons were different between the firms. Monetary value through capital seemed to be one for the research institution in Horten

“We get quite a bit of financial support from the cluster. This year we have received 1,4 mill, in a budget of 12-13 million, that is quite a significant contribution.” (Translated by the authors, H11)

Another reason was the importance of shared projects or courses on topics that the firms had interest in. In Horten it was stated that there was no incentive to arrange network meetings just for the sake of networking. The firms in the cluster are to spread out in market, interest and projects. But to entice with special speakers at meetings, with issues that might interest or a celebratory occasion is often regarded as a way to get the companies to join (H9).

“The cluster has to be attractive for people to show up. And then has to make itself attractive. And that is what we are doing now, with courses and activities and so on. The cluster needs to be interesting in itself.” (Translated by authors, H7)

So we have seen that incentives for participation can differ, and that it is important for the cluster administration to acknowledge them.

In both clusters we found that the cluster administration tried to create shared goals by facilitating collaboration projects. One company expressed that they were motivated by such projects, and had an interest in learning about the supply chain, especially in regard to learning more about effective production (T2). This is a project that is initiated by the cluster members, and facilitated by the cluster administration. We see that such projects facilitate the ability to

connect, and therefore stimulate what we found to play an important role in the content of social relations. In addition, this project was important for several of the other firms in the cluster, and they further collaborated on it. Through this collaboration it was said that they gained trust towards each other and built sustainable relations, and also implemented what they learned in their firms (T4). This shows how collaboration can build trust, which we have related to the motivational aspect of the activation framework. Thus we see that shared projects affect the formation of social capital.

In Horten they have the same type of project as in Trondheim, and it seems to be relevant for all the firms. They have said that they want to participate in the project, but they do not seem to have the same motivation to prioritize it. As they have not made time to have the meetings they planned (H7, H8, H10). Even though they have a shared project, there has to be an incentive there to prioritize it. Our findings have indicated that the cluster becomes an on/off thing, and the firms' participation in the cluster is not important compared to the daily business. We therefore suggest that shared projects in themselves are insufficient, the projects needs to be tied to the firms external market and to the factor time. Hence, shared goals can be seen as an external factor that is defined within the context draw by the market. This is illustrated in figure 3, where the market puts the outer frame around the activation of social capital, and shared goals are a factor within this frame. In addition to being tied to the market, the projects are tied to the factor of time, which will be discussed below.

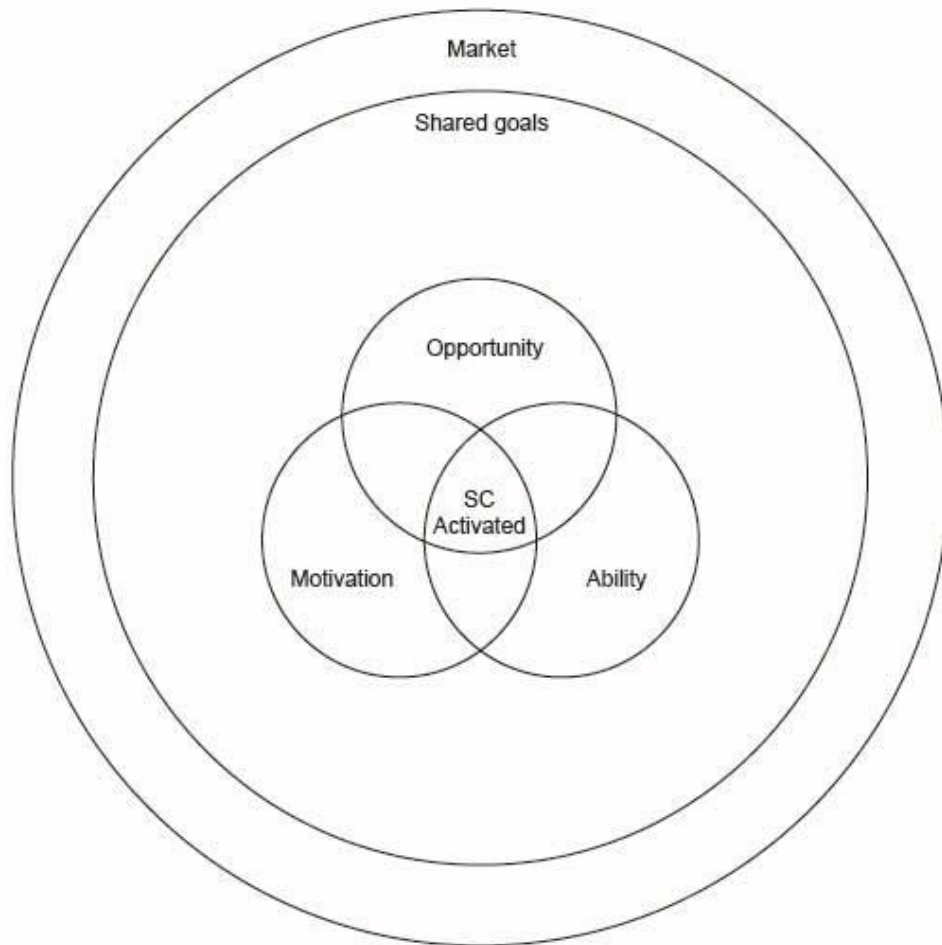


Figure 3: The activation framework extended with market and shared goals.

The inner rings represent each of the factors opportunity, motivation and ability. Social capital is activated when they overlap, as shown in the center of the figure. The context is defined by the market, which is shown by the outer ring. Shared goals must be tied up to incentives created by the market, and is represented by the inner ring.

6.3.3 The importance of time

Time has been a recurring topic through our discussion. This has been tied to opportunity by having the time to meet and create network bonds. In addition, it has been found to impact the formation of ability and motivation. For instance we have seen that the firms know that it takes time to understand the value of the network in the cluster (T5). Thus, it takes time to develop ability. For instance in Trondheim, at the first breakfast meetings people showed up only five minutes before the start of the meeting, now they meet 30 min before to attend the mingle part of the arrangement (T4&T5). We also see that the process of building trust takes time (T4). Even though they know that the long-time benefits will come, they seem unable to prioritize spending time on the cluster. We suggest that the firms must feel that it is useful for them to participate in the cluster, this can be achieved through learning or market incentives in a greater degree than today. Because it seems like often the cluster has to fight for attention (H10). Therefore it takes incentives for the firms to spend time in the cluster, and to do it in a more constant matter.

We have discussed that the value of the cluster increases if the companies create social relations and cooperate. And we see that those who are the most active gain the most from their membership (T1). Therefore we suggest that the benefits of the cluster increase if the firms invest time in the cluster. Because it takes time to create sustainable and prosperous relations between the firms, and therefore the cluster cannot become an on/off activity. For this to evolve, it has to be a norm in the company that it is important to be part of the cluster. We therefore add time to the context of the activation framework as shown in figure 4 below. It is placed within the frame of shared goals and market incentives as these factors are found to affect the amount of time the firms are willing to spend on the cluster. For instance when the market is bad, or they commit to a shared project, the firms are more inclined to spend time on social relations in the cluster. In addition we have seen that time is very closely bound to all of the components in the activation framework. It affects the opportunity to meet. And both the ability to connect and motivation in the form of trust takes time to build. Therefore we place the time as the inner

factor in the context for the activation of social capital. The extended framework is shown in figure 4 below.

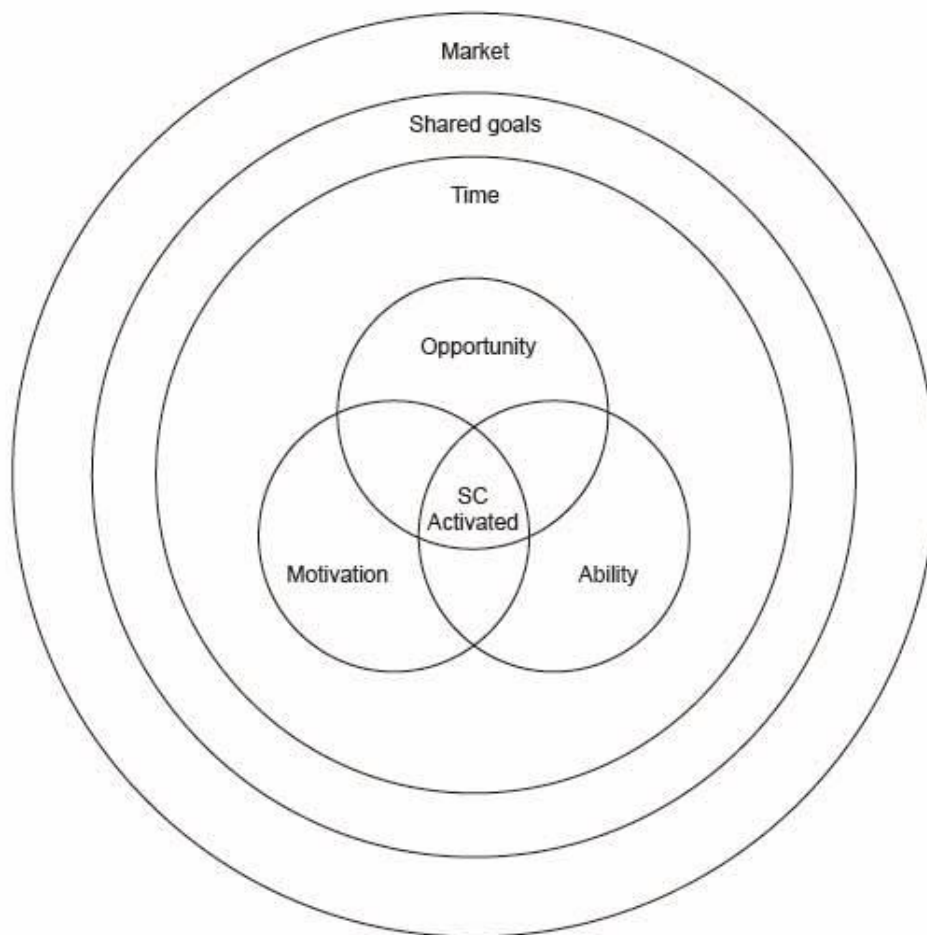


Figure 4: The activation framework extended with the market, shared goals and time.

The three rings in the middle represent the factors opportunity, ability and motivation in the activation framework. The framework states that social capital can only be activated when all of these factors are present; this is illustrated by part in the middle where all of the factors overlap. The framework is extended by including the factors time, shared goals and market, these define the context where social capital is formed.

7. Conclusion

Through our research we have found indications pointing towards firms being mostly interested in what they themselves have to gain. This we believe is related to the companies having a low degree of understanding of what they can gain from being an active part of a cluster. In their actions it seems like they separate between NCE business and pure company business. Thus, cluster activities seem to be an additional occupation. Due to this, they never develop the ability to see what they can gain from others at the cognitive level. And they do not get the opportunity to form new bonds because they do not donate time or effort.

Time and effort from the firms have to be present for the cluster to achieve such a high level of interconnections that it affects cooperation, innovation and competitive advantage. To answer our research question “*What role do social relations play in the prosperity of clusters?*” we suggest that social relations create mutually interdependence between the firms. This facilitates contributing to the cluster as a whole, beyond the firms’ short-term and selfish goals. It is these social relations that create clusters that are more than just plain networks.

The core problem in the clusters we have investigated is that one cannot replicate natural clusters by only emphasizing the building of network structure. One must also build content in those relations, and that takes time. This means that the firms must take the time to participate, and to do that the cluster administration must create share goals. These goals must be tied to the market situation. Thus, we find that to create clusters through a top-down approach, one has to acknowledge the importance of the context. This is because the context impacts the factors in the activation framework, and in order to leverage the full potential in social relations all of these factors should be activated. We find that this is important in order to create the mutually interdependent networks that cause the prosperity of well-functioning natural clusters.

8. Implications - A little less conversation a little more action, please

Based on our research we suggest some implications. We have divided these into three categories, where we first will present what we suggest for the cluster administration, further for the field of research and last for the firms.

8.1 Implications for the cluster administration

The implications we present for the NCE administration is that we recommend them to focus less on geographical proximity and that they must be aware of the market situations when creating cluster programs.

Geographical proximity

We found that the focus on geographical proximity might be a limitation, rather than a strengthening factor, especially here in Norway. We claim this because we saw that firms in Horten were reluctant to participate because they felt that the theme of the cluster did not apply to them. Norway is such a small country, that that one should focus more on theme than area when making cluster programs. Then one could find a more dynamic mass for the cluster. For example one could involve the research milieu at NTNU to work together with companies in Horten. We see that this could increase the interest and therefore outcome of the cluster program.

Awareness of the market

Through our research we have found that the market influences the firm's participation in the cluster. We see that the cluster administration must be even more aware of market changes than today, and be ahead of the firms in terms of linking projects to problems arising from changes in the market. This must be seen in the light of the implication stated above, that clusters should be based more on theme than geographical area. Then the cluster program can easier be tailored to the real needs of the companies. That takes us to our next suggestion, that the administration must incorporate a larger part of the

value chain in the cluster. We found several indications saying that doing so would create a larger incentive for firms to be part of the cluster.

Specific suggestions

As we have seen, the incentives for a firm to participate are an important factor. Therefore we claim that the cluster administration must help the companies gain an understanding of how to implement the cluster in the firm to a larger extent than is done. The way the program is structured today it seems to be up to the firms who that attend cluster activities; it does not follow a system. We suggest that the cluster invests in the firms, and makes sure that there is continuity in who attends. This can be done by arranging courses for the cluster contacts about how to get the most from the cluster, network theory and how to pass information on to the employees. We also strongly suggest that they establish an information platform to reach all relevant employees, which has been thought off, but is not in use. We claim that these measures are important to make sure the participants understand that cluster work is a long-term commitment.

For one, if you spend time and resources on the cluster, it will pay off in the long run, as results are not seen immediately. And second the work that is done within the cluster arrangement will be more continuous. We see that if the cluster invests in the firms, they may demand more action from them. For example, by being more active in cluster arrangements and spending more time and resources towards the cluster. Through being more active, one creates a higher level of trust. When this trust is there, one can push the firms to contribute with more problems that can be topics for projects, or that other firms know how to solve.

We have seen that there is a value in having an informal tone at networking. Therefore we purpose that the cluster administration creates more of such events, and dares to step even further outside the formal context of the cluster. This can for instance be done by arranging weekly social events such as meeting at a local pub, or starts a cluster football team. Such events would attract people at all levels within firms, which we have seen is not done to a

large extent today. Our findings show that such informal events could help on increasing multilevel involvement. We also believe that it will help recruiting to the area, due to a more attractive work environment. This will especially be beneficial for small and mid-size firms, which cannot offer the same work related social benefits such as firm football teams, which create relations and a feeling of belonging.

To sum it up, our suggestions for the cluster administration are:

- Less focus on geographical area, more on theme
- Be more aware of the impact of the market, and include larger parts of the value chain
- Ensure continuity by having a more systematic approach to the cluster contacts
- Teach the cluster contacts how to use the cluster by courses
- Create an information platform
- Arrange more social meeting places with an informal tone

8.2 Implications for the field of research

Our research is exploratory; therefore we see that our findings cannot be generalized without further investigations. In the event of further investigation we especially suggest that one replicates our study in several clusters, to better be able to see the impact of the different factors. We suggest that the NCE Maritime cluster is a good candidate for such a study. Because it is known to be well functioning and has recently been promoted to a Global Center of Expertise. We also see that one should investigate the impact of social relations made outside the cluster setting. For instance, indications show that having kids in the same kindergarten has an impact on how one perceives each other in work related functions. We think that this can influence the level of cooperation in a cluster, and that the NCE Maritime cluster is a good place to study the effect of this.

We found that there has been too much emphasis on the structural part of social relations, and that creating content is very important for the activation for social capital. Therefore we call for more research on this aspect of social relations, especially on the topic of ability to relate on a cognitive level. We see that the content part of social relations take time to evolve, therefore we recommend long-term studies. We also see that relations are not static, they are highly dependent on culture, personality and generation. Hence, long-term studies are well suited for capturing this dynamic.

To sum it up we suggest these implications for further research:

- Replication of the study in several clusters
- Investigate the impact of social relations outside the cluster and firm context
- Conducting long-term studies, as social relations are not static

8.3 Implications for the companies

We see that the companies must dedicate more time and resources towards the cluster in order to make the cluster more prosperous, and to be more beneficial for them. The firm has to invest with a long-term perspective to gain the most from cooperation and being part of a larger network. To gain this long-term perspective we see that the companies must implement cluster theory into everyday business, to a much to a larger extent than today. We also imply that the companies can gain more by daring to share more, and by doing so they can get help on problems that affects business. Then they will also see more specific results, and feel that the outcome of the cluster activities increases.

We found that there is a need for more multilevel involvement, but we also see that involving all employees is not realistic. But we think that by strengthening the cluster contact role, and making routines for sharing and implementing information, the firm could involve its employees to a greater

extent. But we also see that there is a need for creating solidarity through other means. This can for instance be done by the information structure in the firms, and by encouraging involvement in informal social events arranged by the cluster program. At the same time, we suggest that specific employees from each firm should be active in cluster related work. This we suggest to ensure continuity in work with the cluster.

To sum it up we suggest these implications for the firms:

- Multilevel involvement through creating solidarity
- Specific employees that are dedicated to the cluster and dedicated to share information
- Implement learning about the long term benefits of being part of the cluster

9. Limitations

We see that our thesis has limitations. The most prominent of those are accounted for below and should be taken in consideration when reading this paper.

We conducted our study with twelve interview subjects. Almost all of these twelve are well inclined with the cluster, and they are all mid-level or top-managers. They are also middle-aged men, which could affect our empirical findings due to generation differences, differences in how one relates to others socially and in conception of the theme. As mentioned in the method chapter we tried to include a wider variety of cases. In Trondheim we interviewed a representative for a company that is not formally part of the cluster, and in Horten a representative for a startup. Most of our other cases have been involved in organizing the cluster in some way, and we see that this could bias their view on the benefit of the cluster. We also know that a risk of doing case interviews is that the subjects can unconsciously adapt their answers in a way that makes them look good. But we do not think this happened to a large extent in our cases, as we did not experience the subjects as being super-enthusiastic. Therefore we believe that we have gotten a realistic insight in their experience of the clusters. Last, one of the most important factors that influenced our interviews is that each individual's perception of the cluster is highly subjective, which will affect our results. And because we only interviewed managers, we only got indications of how other people in the firm perceived the cluster. Hence, we might have gotten another impression of the cluster if we had included people at more levels in the firm in our cases.

Social relations take time to understand, and it takes knowledge of the subject to capture the signals that are not obvious or spoken off. Social capital also evolves over time. Relations between humans are not static, and they continuously evolve. Therefore we think we could have gotten more nuances if we had followed our cases over a longer period of time. We also found that more observation could be beneficial for this type of study, in order to get a

more realistic image. This is our first use of case study and our first academic paper in these proportions. As the study has evolved, so have we. Our understanding of the subject and approach has been in constant motion, which means that our research might had been planned and conducted differently now, than at the start in February.

Clusters are large, constantly shifting, organizations. We have not been able to look at all aspects of the cluster. Therefore it is important to state that we know that there is a lot going on within the clusters that we have had no knowledge of. In addition we have based our discussion on theory on natural clusters, because there is still little research done on the matter of structured clusters. Of course we see that the conditions in natural clusters might not be perfectly transferable to structured clusters. But as we conducted an exploratory study, we see our research as only the first step of many in gaining more knowledge about how social relations behave in structured clusters.

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H7. Company 7. Horten

H8. Company 8. Horten

H9. Company 9. Horten

H10. Company 10. Horten

H11. Company 11. Horten

H12. Company 12. Horten

T1. Company 1. Trondheim

T2. Company 2. Trondheim

T3. Company 3. Trondheim

T4. Company 4. Trondheim

T5. Company 5. Trondheim

T6. Company 6. Trondheim

Appendix A Intervjuguide

Introduksjon:

- Presentere oss
- Gi en kort introduksjon til tema for intervju:
 - What role do social relations play in the prosperity of clusters?
- Informere om at vi skal ta opp intervjuet
- Informere om at personen kan få lese den transkriberte versjonen av intervjuet

(Starte båndopptaker)

Om bedriftens holdning til klyngeprogrammet:

- Fortell om hvorfor dere valgte å bli med i klyngen.
- Fortell om bedriftens relasjon til klyngen i dag.
- Beskriv kontaktflater med både klyngeprogrammet og med andre medlemsbedrifter i klyngen.
 - Har dere en person som har ansvar for kontakt med klyngen?
 - Kan du beskrive hvordan informasjon typisk deles fra klyngeprogrammet til bedriften og andre veien?

Om samarbeid innad i klyngeprogrammet:

- Fortell om et eksempel på et samarbeid som har oppstått etter at dere ble en del av klyngen.
- Hjelpespørsmål:
 - Hvordan var prosessen som førte frem til dette samarbeidet?
 - Hvem tok initiativ?
 - Hva førte samarbeidet til?
 - Hvordan fungerte dette samarbeidet?
 - Var alle involverte en del av den offisielle klyngen?

- Hvordan opplever du kulturen innad i klyngeprogrammet?
- Kan du nevne eksempler på faktorer som hindrer samarbeid mellom medlemsbedrifter i klyngen?

Om relasjoner, informasjonsflyt og møtepunkter:

- Hvordan deles informasjon mellom bedrifter i klyngen?
- Kan du beskrive eksempler på at informasjon du har fått gjennom medlemskap i klyngen har hatt påvirkning på bedriften?
- Kan du nevne eksempler på faktorer som kunne gjort det lettere å dele informasjon mellom medlemsbedrifter i klyngen?
- Kan du beskrive påvirkningen medlemskap i klyngen har hatt på nettverket til bedriften?
- Fortell om bedriftens erfaring med arrangementer i regi av klyngen.
- Hjelpespørsmål:
 - Har dere deltatt på noen arrangementer? Kan dere utdype om hva slags type arrangementer dere har deltatt på? Hva får dere mest utbytte av?
 - Kan du beskrive eksempler på utbytte bedriften har fått av å delta på slike arrangementer?
 - Kan du beskrive eksempler på positivt utbytte av å delta på slike arrangementer?
 - Kan du tenke deg noen negative sider ved å delta på slike arrangementer? Hvordan er forholdet til andre bedrifter som er konkurrenter?
 - Hva mener du at du personlig får ut av å delta på slike arrangementer?

Avsluttende spørsmål:

- Hvordan syns du bedriften burde utnytte klyngen?
- Hvordan opplever du at dine ansatte/medarbeidere stiller seg til klyngesamarbeidet?
- Er det noe mer du syns vi burde spurt deg om?

