Network picturing: An action research study of strategizing in business networks

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This is the accepted and refereed manuscript to the article published in

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Abstract

This paper aims to understand how managers use network pictures in their strategizing decisions. In business networks, strategizing concerns decisions about how to interact with, mobilize and influence other actors through connected relationships. One way to understand how managers strategize is to understand their network picturing processes. Network picturing is concerned with how managers' network pictures (their understanding or sensemaking of their network of connected relationships) translate into managerial analysis, options and decisions about networking activities.

The study presents a novel research design within the industrial network tradition. It utilizes an action research design including elements from process research and longitudinal case studies, where a group of managers is followed over a three-year period. Through interviews and exercises, the study investigates how the participant managers understand and act in their business network.

The results indicate that using network pictures to map connected relationships proves to be a meaningful theory-in-use and a practical tool for managers. The participating managers have become more aware of the complexity and interconnectedness of business relationships. The results also suggest that the network picturing process may occur in three distinct phases, where the managers gain a more nuanced and detailed understanding of the network, and are thus able to actively engage in broader and deeper networking activities. However, this process is both dynamic and messy, and includes incidences of re-evaluating network pictures in light of unexpected network outcomes.

The findings contribute to our knowledge of the interplay between cognition and action, a conceptually as well as managerially under-researched area. It adds to our understanding of network pictures by analyzing how this concept is used to understand managerial decision-making. Additionally, it complements the existing strategy and management literature by suggesting that managers create and recreate their understanding of the network by interacting with one another, where network picturing is an ongoing process analysis that in itself transforms perceptions of the "inside" and "outside" commonly associated with classical strategy and SWOT analyses.

Keywords

Strategizing, action research, network pictures, decision-making, business relationships, business networks

1. Introduction

Companies need to make strategic decisions in order to survive and prosper. Relational theories claim that such decisions are particularly concerned with the issue of how a firm should relate to other companies and actors, how it interacts with them, and responds to their actions (Gadde et al., 2003; Holmen & Pedersen, 2003) This is due to the fact that firms need to mobilize resources by interacting with other companies, such as suppliers and customers (Håkansson & Waluszewski, 2002; Mouzas & Naudè, 2007; Pfeffer & Salancik, 1978). Strategic decisions about how to build business relationships are therefore of key importance, as a company's success or failure is closely connected to the outcome of these actions. Central to strategic decision-making in business relationships is the activity of *strategizing*, which concerns choices about how to interact with, and mobilize as well as influence, other actors through connected business relationships (Gadde et al., 2003).

One way to understand how companies, or more precisely the managers within such companies, seek to strategize is to understand their *cognition* and *sensemaking*, which provides insights into the 'theories-in-use' that they apply when making decisions (Argyris, 1978; Cornelissen, 2002). Of particular interest with regard to their decisions is the concept of managers' *network pictures*. Network pictures are managers' theories-in-use about their business network, i.e. how they make sense of their network of connected relationships (their environment), how they perceive strategizing options, and how they evaluate these collectively (Geiger & Finch, 2010; Henneberg et al., 2006). While several studies have developed an understanding of the structures and characteristics of network pictures, as well as the behavioral outcomes (Abrahamsen et al., 2012; Corsaro et al., 2011; Henneberg et al., 2006, 2009; Kragh & Andersen, 2009), the *managerial process*, i.e. the specifics about how managers use their understanding of the network to prepare,

evaluate, and make strategizing decisions, has remained somewhat unexplored. In line with Ramos et al. (2012) and Henneberg et al. (2010) we refer to this managerial process as *network picturing*. Thus, we are concerned with network picturing as the interplay between cognition and action, in particular relating to what managers perceive (their network picture) and what they do (their strategizing activities). These two aspects as part of network picturing, i.e. understanding the network on the one hand and strategizing on the other, are linked together through an evaluation of available strategic options. To understand this interplay, our research is based on a specific case study, seeking both conceptual knowledge development as well as managerial problem-solving. This research approach highlights the managerial relevance of the research outcomes, and the problem-solving involvement by the participating researchers (Gibbons et al., 1994; van Aken, 2005). Using network pictures, as well as other network- and relational concepts associated with the industrial network approach, an intervention-based longitudinal study with top managers of a case company explores the network picturing processes, learnings, applications, and adaptations with regard to their strategic decisions. Thus, we as researchers deliberately intervene in the process at different points in time (by providing conceptual input, as well as suggestions for strategizing tools), and then observe the outcome of these interventions.

Our main contribution is therefore to fill a theoretical gap in the literature with regard to the conceptual understanding of managers' network pictures and how such network pictures are used in managers' strategizing decisions. This results in a better understanding of the network picturing processes within a group of managers in a complex business network environment. As such, we explore the use of network pictures in a novel setting, which complements the existing strategy and management literature and provides, to the best of our knowledge, the first action research study within the industrial network research tradition (see McGrath and O'Toole, 2012, for a discussion of action research design in network related studies).

The paper starts with a discussion of how actors relate to their wider business environment. Implications for strategizing in networks are discussed, and network picturing is introduced as one way of understanding how strategizing decisions are affected. The rationale for adopting an action research design is introduced and the case company as well as the research process is described. Finally, we discuss our findings, both from an empirical point of view, as well as their implications for theory, before we propose some managerial implications.

2. Strategizing and the Industrial Network Approach

Within the industrial network approach (also known as the IMP approach), an actor's ability to act seems somewhat limited because of an infinite web of ties within the business network which leads some authors to perceive only limited importance for strategizing activities: "*Accordingly, to suggest strategies for action is problematic: The sheer unknowability of effects and outcomes in a network means that we may even conclude that the effectiveness of strategic business decisions over time is likely to be largely a matter of luck!*" (Ford & Mouzas, 2007, p. 8). Still, while outcomes of strategic decisions may be uncertain, it is possible to say something about strategies, strategizing, and the interplay with the characteristics of business networks. Recently, such issues have become a topic for further research within the IMP tradition (Baraldi et al., 2007)

In this research tradition, strategy and strategizing has become an issue of handling the complexity of relational interdependence; moreover "*strategic action is defined as efforts of a firm to influence its position in the network of which it is part.*" (Gadde et al, 2003, p. 358). In a network, an actor has a distinct *network position* based on its connected business relationships (Abrahamsen et al., 2012; Zaheer & Bell, 2005). These relationships or dyads can be understood in terms of how the resources are tied together, how the activities are linked, and how the different actors interact, also known as the ARA-model (Håkansson & Snehota, 1995). In networking terms, strategizing is

concerned with choices related to 'how to network', i.e. how to manage in business relationships and affect one's network position. Networking is seen as "*managers' attempts to change and develop interactions and relationships with others*" (Håkansson et al., 2009, p. 195). Håkansson et al. (2009) suggest three aspects of networking related to strategic choice. The first relates to choices within existing relationships, linked to opportunities and limitations in business networks (Håkansson & Ford, 2001). The second is concerned with choices about position within the business network, and relates to decisions about how a company is simultaneously influencing and being influenced by its network. The third is concerned with how to network, where a company is exerting control over and at the same time is being controlled by other actors. However, such networking decisions are preceded by a specific understanding of the embedding network, by the 'theories-in-use' which managers form about the network, its characteristics, and therefore its options and rigidities (Henneberg et al., 2006). Such issues can be discussed in terms of how actors make sense of the business network, i.e. how they form their *network pictures* and how they reach strategizing decisions, or their *network picturing*.

3. Strategizing and Network Pictures

Networking decisions can best be seen in relation to the *network pictures* that actors have of their surrounding network. According to the industrial network approach, these concepts are related to each other within the *managing in networks*-model, consisting of three different dimensions: network pictures, networking activities, and network outcomes (Ford et al., 2011; Håkansson et al., 2009). These three dimensions are all interconnected. Actors have their individual network pictures or perceptions of their network, based on their experience from previous interactions with other actors, as well as based on expectations about the future (Henneberg et al., 2006). Network pictures may be idiosyncratic or related to common views and stereotypes related to certain types of

network (Cornelissen, 2002), thereby subjectively explaining who should do what in the network, who is in control of the network, why certain outcomes occur in the network, etc. The network pictures concept suggests that an actor interacts with the network on the basis of his/her personal interpretation of the network (Abrahamsen et al., 2012; Henneberg et al., 2006; Henneberg et al., 2010; Mouzas et al., 2008). Network pictures are seen as a way of representing actors' knowledge of their network, i.e. as managers' network theories (Mattsson, 1984, 1987) helping them to make sense of their complex environment and to guide their decision-making and managerial behavior (Cornelissen, 2002; Welch & Wilkinson, 2002). Based on such sensemaking about the network, managers engage in *network picturing*, transforming their subjective knowledge about the business network into managerial options about certain possible *networking activities* and likely outcomes of these. Based on the resulting option analysis of possible network activities, firms strategize by choosing and enacting certain options. As companies interact in different business relationships based on their network picturing and strategizing decisions, this process results in certain network outcomes. Such network outcomes can relate to a single actor, the dyad (business relationship), or the wider network.

This activity perspective of strategizing in networks acknowledges that the strategic problem for the individual firm is to participate in the process of dynamic interactions, and being seen as a viable participant in the networks that evolve (Wilkinson & Young, 2002). Strategizing is therefore concerned with choices regarding how to interact with, and mobilize as well as influence, other actors through connected business relationships (Gadde et al., 2003). Rather than pursuing 'victory' over others based on firm-specific resources, activities or monopoly-like industry positions, "…*strategic thinking involves a company coping with all of those with which it has important relationships or on which it depends, including its suppliers, customers as well as its competitors.*" (Ford et al., 2011, p. 3). These interaction and mobilization choices will affect a company's network

position, i.e. how it relates to others in the business network, which in turn affects its performance, in terms of resource availability or sales opportunities (Håkansson et al., 2009; Johanson & Mattsson, 1992; Turnbull et al., 1996). Making sense of and assessing interaction via network picturing, or understanding one's own network picture as well as those held by other actors (Henneberg et al., 2010), is a vital part in this type of strategic analysis as "*...no manager has a complete view of the network and each has to interact with others to try to learn from them or to convince them about their view*" (Håkansson et al., 2009, p. 194).

While recent research has looked at characteristics of network pictures (Colville & Pye, 2010; Geiger & Finch, 2010; Henneberg et al., 2010; Kragh & Andersen, 2009; Purchase et al., 2010) their complexity (Ramos et al., 2012) or inter-subjective nature (Mouzas & Henneberg, 2015), there exists little research into network picturing, examining how managers use network pictures to assess their strategic options, the practices around how they learn in business networks and adapt network pictures as a group, and also how they decide on strategizing activities. As Laari-Salmela et al. (2015) point out, "*...extant literature has to a large extent treated the concept of network pictures as decoupled from strategizing and the empirical evidence on the relationship between actors' network pictures and action is limited.*" (p. 117). There is therefore a need for greater understanding of the link between managers' cognition and action.

4. Research Design and Methodology

4.1. Research mode and level of analysis

This research project is aimed at addressing three interconnected research questions, which are related to the issue of network picturing as cognition and strategizing in business networks. In particular, the research questions we focus on are 1) *Do managers perceive network pictures as a useful tool in practice to make sense of their business environment?*, 2) *How do managers express*

and utilize their network pictures?, and 3) *How do network pictures translate into managerial analyses, networking options and strategizing actions*? Aligned with these research questions, which are mainly aimed at generating academic knowledge, the research aims at fostering the performance of the case company, in line with 'mode 2' research (Harvey et al., 2002; MacLean et al., 2002; van Aken, 2005). Due to the action research framework, the specific managerial aims emerged during the research process. Thus, they are embedded in the research process and are not given *a priori* as in traditional academic research questions.

Our level of analysis is a group of top-level managers within the case company. During interviews and exercises we have focused on how these managers understand and act in their business network. The interviews and exercises have been conducted mainly on a group level, but we have also followed up individual managers to further understand their sensemaking and subsequent actions (see table 1 for an overview of research methods used).

4.2. Case study company characteristics

From 2011 to 2014 we conducted a longitudinal case study in which marketing and sales executives of a large industrial corporation in Norway's food industry participated. The focal company, Northcon Industries Ltd[1], is a leading Norwegian manufacturer of goods and equipment for the food industry. Annual turnover (2013) is 5.5 billion NOK (about US$670m). The company has a long history - it was founded over a hundred years ago, and today it is the global leader in its field. It has three factories and three sales offices located in Norway totaling 200 employees. In addition, it has sales offices in the UK, Ireland, Australia and Japan. Northcon has two major competitors in Norway, and between them these three companies have 80% of the global market. On the customer

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[1] The name of the company (as well as of competitors and other actors in the network) was changed due to confidentiality reasons.

side, the picture of a concentrated market is very much the same, with 20% of the industrial customers representing 80% of Northcon's turnover, the two biggest customers being Scanco and Luxor. The industry is highly innovative, and Northcon tries continuously to bring new product solutions to market in order to stay ahead of their competitors and create value for their customers. The products are divided into two main categories; bulk and high-end products. Bulk items represent good quality products, but they are low on innovation, include few customer adaptations and provide low profit margins. This product range represents the majority of sales for Northcon. The high-end product range is more innovative and is based on tailoring product characteristics to specifications according to customer needs; this is often done in close contact with the customers' R&D departments. Profit margins for these products are higher, and an important task for the sales force of Northcon is to try to convince their customers to move their demand from bulk to high-end items.

Although the industry is characterized by few sellers and buyers with strong relational ties between them, bulk sales are characterized by more transaction-based interactions where the industry customers shop around based on price. At the same time, the customer companies want to have several suppliers to choose between, so annual rounds of industry negotiations ensure that one supplier never achieves a dominant position. The high-end products are more relationship-based, as a large degree of adaptation between the parties is necessary to create such offerings. Northcon's main marketing and sales strategy is therefore to move their customers over to these types of relationships which in their view act as a barrier to competition, represent higher profits, and enable continuous learning and adaptations with key customers.

4.3. Research Design

An action research framework (Perry & Gummesson, 2004) was chosen for our longitudinal case study analysis. Action research "*... aims to contribute to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework.*" (Rapoport, 1970, p. 499). This choice was driven by the characteristics of the research questions and the notion of mode 2 research, highlighting the managerial relevance of the research outcomes and the problem-solving involvement by the participating researchers (Gibbons et al., 1994; van Aken, 2005). The overlap between action research methods and uncovering theories-in-use by managers has been noted before (Beverland & Lindgreen, 2010). As such, a *participatory action research* (PAR) was deemed most appropriate to develop practical knowledge and improve organizational learning (Reason & Bradbury, 2001). Participatory action research is based on cycles of intervention, action, and reflection by the participating researchers as well as the managers in the case company (Murray & Ozanne, 1991; Ozanne & Saatcioglu, 2008; Reason, 2006). However, participatory action research is not only about improving practical issues, such as organizational performance, but also concerns itself with evaluating certain theories in a specific setting (Reason & Bradbury, 2001). In our research, we test certain strategizing concepts related to the industrial network approach.

Action research represents an interpretivist ontology, which suggests that knowledge is contextual and socially co-created. Therefore, managerial solutions are negotiated in value-laden environments (Ozanne & Saatcioglu, 2008). Epistemologically, both researchers and managers are implicated in the knowledge-creation process, and the resulting accounts are collaborative results of such processes (Reason & Bradbury 2001). This inevitably means linking conceptual models with managerial theories-in-use (Ozanne and Saatcioglu 2008). In our research design, we use the practice of 'academic interventions' to introduce concepts related to the industrial network approach, but then allow 'local expertise', i.e. the managerial theories-in-use, to change and adapt

these concepts in the context of specific strategizing issues faced by the case company. Heron (1996, p. 41) called this the "*primacy of the practical*". This process is followed in a cyclical way over time, with interventions, use and adaptation, implementation, and reflection phases resulting in further interventions (Susman & Evered, 1978), a process often referred to as the *action research spiral*. This cyclical process ensures that managerial activities ('actions') have been instigated, as "*learning occurs when understanding, insight and explanation are connected with action*" (Argyris, 2003, p. 1179).

To ensure the validity of our participatory action research process, we use the five (interconnected) criteria commonly employed to test the quality of action research (Anderson et al., 1994; Reason, 2006; Reason & Bradbury, 2001): *Outcome validity* refers the fact that a managerial problem has been solved as part of the research process. *Democratic validity* assesses if all relevant stakeholders participate fully in the research process. Whether ongoing learning and development is fostered relates to the *process validity*, while *catalytic validity* is the extent to which collaborators are invigorated by the learning processes, also going beyond the research aims. Finally, *dialogical validity* refers to peer-related check-and-balance systems regarding interpretations made during the process (Ozanne & Saatcioglu, 2008; Reason & Bradbury, 2001; Wilson, 2004).

Our study also has characteristics associated with longitudinal and process research. The terms are sometimes used synonymously, but according to Paavilainen-Mäntymäki and Welch (2013) there is a temporal distinction: longitudinal research refers to a study which takes place over an extended period of time, whereas a process may be short in duration, and may also have explanatory purposes (Mohr, 1982). Halinen and Mainela (2013) see process research as one type of longitudinal research, involving the study of how and why a particular, temporally evolving phenomenon unfolds over time. A commonly used definition of longitudinal research is provided by Menard (1991) characterizing it as research in which a) data are collected for each item or variable for two

or more distinct time periods; b) the subjects or cases analyzed are the same or at least comparable from one period to the next; and c) the analysis involves comparison of data between or among periods. All these characteristics are applicable to our study. Process research is regarded as an important qualitative approach in the study of strategy and organizations (Langley, 2009; Pettigrew, 1997; van de Ven & Poole, 2005), and is particularly useful in the study of networks because of their inherent dynamics and complex processes (Hedaa & Törnroos, 2008; Makkonen et al., 2012). Process research has gained increasing attention by business network researchers (Halinen et al., 2012; Hassett & Paavilainen-Mäntymäki, 2013), but also imposes several challenges (Halinen & Mainela, 2013). The first relates to defining items for which data are collected. A choice with reference to the *unit of observation* and the *network coverage* needs to be made. The unit of observation in process studies is often related to the perceptions of the individual managers, due to the assumption that company level and network level phenomena can be reduced to and described by individual managers. Network coverage relates to data that are typically collected from several companies and relationships. Our study features respondents from a single focal company, but a similar research design has been applied in other process studies (Coviello, 2005; Hallén & Johanson, 2004). The second challenge refers to defining the time periods for which the data are collected. Flick (2004) distinguishes between studies interested in the past (retrospective), the present (snapshots of current events) or the follow-up of a process (longitudinal studies). Our study falls within the third category. Researchers also need to take into account the access point to the process, i.e. how long the investigator is in contact with the phenomenon. Halinen et al. (2012) suggest three approaches: flow mapping (the researcher is continuously involved in the process), sequence mapping (the researcher is involved at several points in time) and point mapping (the researcher takes a snapshot by accessing the field once). Our study can be described as sequence mapping.

The third challenge relates to keeping the subjects of dynamic phenomena comparable over time. This is particularly challenging when studying network processes, because networks are dynamic (Håkansson et al., 2009; Håkansson & Snehota, 1995). Case studies are one way of addressing this issue, as cases provide the basis for a holistic view of a phenomenon (Gummesson, 2000). A case study also "*enables unexpected changes, different viewpoints and complex relations to be considered as they appear*" (Halinen and Mainela 2013, p. 195). Halinen and Mainela (2013) state that it is important to fix a phenomenon in order to be able to study it over time, and recommend that researchers take the focal company view (as we have done in the present study). The fourth and final challenge relates to building comparisons in the analysis of complex data. Longitudinal data should, according to Menard's (1991) definition, allow for comparisons between time periods. Halinen and Mainela (2013) acknowledge that qualitative data is difficult to compare over time, as the actors and the relationships change. However, this represents the inherent nature of process research, and these dynamics are the phenomena we aim to understand. Thus, we are less concerned with comparing data across time periods, wanting instead to use this data to understand how managers act on the basis of their evolving network insights. The ability to capture the temporal dimension is further dependent on the quality of the data collected. Mari and Meglio (2013, p. 299), in a meta analysis of studies using longitudinal research methodology, recommend that "*data collection should preferably be conducted using a multiple-technique approach if scholars want to build evidence which is both broad and deep*" (p. 299). Among their suggested methods are personal interviews, group interviews and participant observation, all of which have been used in the present study (see table 1 for a presentation of research tools used).

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Insert Table 1 about here

4.4. Research Process

The action research process consisted of three main interventions. The first was a workshop, which introduced the participants to the frameworks and tools, and the second was a group interview where the participants reflected on their insights and decisions. The final intervention was in form of individual interviews where the participants reflected further on the insights they had gained and the actions they had taken. The research process design is presented in table 1.

4.4.1. First intervention phase: Introduction to key concepts

The first invention (kick-off intervention) with the case company took place in November 2011. The senior management team, consisting of 20 people representing marketing, sales, product development and finance, was invited to a two-day workshop. This was part of an ongoing executive management program by a Norwegian university. This program introduced the participants to a range of business subjects such as marketing, team leadership, business economics and project management. The intervention was part of the marketing module. The case intervention familiarized the participants with the general theoretical assumptions of the IMP Group, particularly the industrial network approach, and more specifically the interaction model (Håkansson, 1982) and the ARA-model (Håkansson & Snehota, 1995). A particular focus was given to the network picture concept (Henneberg et al., 2006).

The participants were divided into three groups during the workshop. These groups represented the sales regions where the participants had their main customers. Each group was asked to (1) pick a particular relationship with a customer company that they wanted to improve through particular strategizing decisions. The relationship could be either a particularly troublesome one, or one that

was part of the upcoming annual negotiation rounds and which therefore needed particular attention. The participants were then asked to (2) describe this relationship in terms of the ARA-model. Using this relationship and the ARA-model as the basis for their analyses, the groups were asked to (3) draw and discuss the relevant relationships connected to this focal relationship. Particularly interesting were those relationships that could help strengthen the focal relationship through interactions between the actor bonds, resource ties and activity links across these connected relationships. Furthermore, other relationships that hindered the focal relationship were also singled out as relevant. The groups were also asked to discuss network dynamics and 'what if"-scenarios (see Appendix A for a detailed description of this process exercise). Subsequently, the participants were asked to (4) bring these analyses and new conceptual perspectives back to their daily working environment, and 'put theory into practice'. They were not restricted in terms of how to use these perspectives, concepts and tools, and were encouraged to adapt them to their specific task and context. Thus, after the first intervention we wanted to understand how managers used (and changed) the concepts and tools, how they embedded them in their managerial practices and routines, and what new insights they created in terms of finding strategizing options. Furthermore, we wanted to capture the resulting networking activities that the managers tried to implement to help address their strategic marketing challenges.

4.4.2. Second intervention phase: Usage and insights provided by key concepts

In March 2012 we conducted two follow-up workshops with seven of the managers who had participated in the first intervention phase. These two workshops had different characteristics. The first took the form of a group discussion, where the researchers took an active part in the process. At the start of the discussion the participants were given a short summary of the main concepts that had been introduced in the first intervention session. They were then asked to report and describe

if and how they had worked with these perspectives and tools, and if so what insight they had gained and what actions they had taken. In the second workshop, the researchers played the role as a participant observer of the managers' discussions around how they had used the concepts, and what insights they had gained.

4.4.3. Third intervention phase: Usage and insights provided by key concepts

In August 2014 we conducted a third intervention in form of in-depth personal interviews with four of the managers of our original sample. Due to major developments unfolding in the industry, they were unable to meet with the researchers before this point in time. We would ideally have conducted a group interview with the whole of our sample but, given that this option was not available to us, decided that in-depth personal interviews with a selected number of dedicated respondents would give a sufficient overview of their activities and insights. In these interviews we addressed the status of the focal business relationships identified in the first intervention phase, before identifying changes in the relationships since the second intervention. We then addressed how insights from previous sessions influenced or impacted the understanding of these relationships, and whether these insights impacted on their decision-making and actions. In particular we wanted to see whether the managers had continued to use the tools previously introduced as a way to analyze changes in their most important relationships.

5. Results and Analysis

Our analysis centers mainly on the second and third interventions, as these two points in time enable a reflection on preceding networking activities. We structure the presentation of results around our two broad categories inferred from our research questions: how have the managers used the tools, and what insights they have gained and what actions have they taken. Using content and

thematic analysis techniques (King, 2004), we have then grouped the results under key headings inferred from our empirical data. These are discussed in turn below, and summarized in Table 2 at the end of this section.

5.1. From 1st to 2nd intervention: How have the managers used the tools?

5.1.1. Tools used to map and analyze key relationships

The managers have clearly used the theory and tools extensively in their daily management practices. They have analyzed Northcon's relationships with its two major customers, Scanco and Luxor, and have created network pictures (referred to as 'relationship maps') identifying how these main relationships are connected to other relationships in the network.

5.1.2. Network pictures used to map customers' internal organization

This has been mainly an internal exercise, but in some cases Northcon have included their customers in the development of these maps. As one respondent reports: "*We have drawn maps of two particular relationships with Scanco, which is one of our biggest customers. In this particular relationship it is difficult to keep track of who in Scanco are influencing their buying decisions.*" They then included the customer in the exercise: "*We used the relationship map to identify Scanco's organization and identify their key people. Then we took this exercise with us to the customer's organization, and asked them about who was influencing whom. Not directly, but we tried to verify our picture and come up with people we needed to have a relationship with. Now we are starting to see some results. We have had three different meetings with people at Scanco to find out who is influencing their buying decisions. This is a complex process, and we are not finished.*"

5.1.3. Network picturing is rewarding but challenging

Mapping relationships and creating network pictures is a complex process: "*We have mapped our key relationships with our customers, and we have experienced varied results. One of our management team has taken this very seriously. He has created a good relationship map of his region and has made some action points. But our sales people represent different regions, and they have different motivations. Being in a workshop is also different from real life.*" Evidently, one needs to be dedicated to using this tool as it clearly contrasts with other strategy tools with which they are familiar. Another respondent identified a similar issue: "*But at the same time it is not easy. I like the clear and concise strategy tools, such as the SWOT analysis. But this type of analysis gives me added value, and we can apply it in combination with the SWOT. When we for instance have our Key Account Management analysis, we get a lot of information that can be used in mapping our relationship.*"

5.2. ***From 1st to 2nd intervention: What insights have the managers gained and what actions have they taken?:***

5.2.1. *Managers have broadened their horizon*

Creating and recreating network pictures as well as using the associated concepts have helped the Northcon managers to broaden their horizon and see a 'bigger picture'. But this is also a complex process: "*In our relationship with Scanco, this was not easy to do because it soon got very complex. It is easy to start off with the relationships you have, and pick out the names. But when you start to look at the suppliers of that company, and other suppliers, it rapidly gets from a very small to a very complex picture. But it's a good exercise. You see all the connections, and even some connections that you are not aware of. This was at first an internal discussion on our part, that*"

started during the first workshop. But we have now discussed some of these issues directly with

Scanco. This has been a good process."

5.2.2. Better understanding of customers' internal processes and decision-making

This insight has helped the managers to better understand their customers and their customers'

internal processes: "*We now understand Scanco's organization and their decision-making process*

better. Last week we had a breakthrough. We had struggled for a long time to find the right people

to approach at Scanco. At our last meeting we were able to establish just that, and we could

approach these persons and make a case for our high-end products. Our information has helped

us target the key people in the Scanco's organization that are responsible for developing new items."

This has also helped Northcon to give more precise information about the usage of their products

to the right people at Scanco, and correct apparent misunderstandings about product performance:

"*Scanco has previously used our products incorrectly, and have often complained to us about lack*

of product quality. When we have tried to approach them with information about how to better use

or products to make their production more efficient, we have not had access to the right people.

But now we have."

5.2.3. More distant network actors identified

The network pictures have further helped Northcon in identifying more distant actors in the

network, ones that also have an impact on their customer relationships: "*We have a relationship*

with Scanco concerning new product development. Here we have become aware of other actors

that may be influential to this relationship, such as industry standard agencies, government

organizations, NGOs, etc. We have asked ourselves 'who can join the project, what are the

consequences if they do, and how can we manage the process?'" They have also discussed how

these more distant relationships are related: "*Can we sell our high-end products to other customers once we have developed them for Scanco?*", they inquired. This has given them new perspectives on their network: "*As a team we have broadened our horizon and we have challenged any premade assumptions.*"

5.2.4. *Sales organization reorganized*

These exercises have given Northcon a better overview of their ties to Luxor, the other main customer, and this has given them new perspectives on their relationship. "*We made a relationship map for Luxor on a worldwide basis, and realized that we didn't have relationships with the key decision-makers. We are therefore changing our sales organization. Now we think in terms of regional networks, not just customers.*" The fact that Northcon has changed the model for its sales organization relates to a major organizational restructuring which is partly the outcome of the action research process. The sales managers came to realize that their current organizational structure did not reflect the understandings gained from creating a broader network picture. Northcon has traditionally organized its marketing and sales activities as relationships where a Key Account Manager (KAM) is responsible for each customer. Looking at how these relationships were connected in a more complex business network picture, they realized that they needed to organize their marketing activities in a way that reflected this complexity. Hence, they have decided to move away from a KAM sales organization to a model where regional managers are responsible for all relationships in one region. Northcon expects that this new structure will enable them to deal with the complexity of all the connected relationships in a region, independent of specific customers.

5.2.5. *Improved value to customers and connected actors*

Northcon is now in a position to provide better value for their customers, because they talk directly to key decision-makers and are able to provide relevant information on product characteristics. Subsequently, this has strengthened Northcon's position in their network: "*We have had meetings with Luxor's CEO and CFO, and have discovered that they know very little about the value that our products create for them. We were challenged to explain why Luxor should buy these items from us in the first place, and now we could voice our arguments and convince them. We were also invited along to Luxor's end-customers, NGOs and relevant authorities, and together with Luxor we had the possibility to explain the value that our products together represent to these connected actors. This is some achievement! Now we are invited along as their preferred supplier. All this is part of our relationship building. We have mapped our key relationships with Luxor, and built it from a small picture to a bigger picture.*"

5.2.6. New content and focus for customer meeting arenas

Northcon has similarly gained a new perspective on how they network with people from the customer organizations. For instance, an annual customer teambuilding seminar took a new format: "*In February we went away to a sunny destination with 110 people from all our customers. This was people from different functions and levels; from top management to the shop floor. Together this represented an interesting network, and a good opportunity to mix and meet. We have done this for 15 years, but this time I realized that this was a good opportunity to interact with my network on a 24-hour basis.*" This improved Northcon's ties to their customers: "*It was productive; we deepened our relationships, and actually signed some new contracts. Earlier we have mainly held this seminar for the lower-level management and the production people. But this year we decided to include our top management, and invite top people from the customer side. And it was very successful!*" Apparently, developing a deeper understanding via their network pictures

allowed Northcon to understand the manifold inter-personal ties underlying their business relationships with their customers, and enabled them to understand the importance of having all of these inter-personal levels represented in their meetings.

5.2.7. Co-creation of network pictures with customers

Northcon believes that sharing network pictures may be a good way to discuss an upcoming issue with Scanco. Recently, this customer has threatened to start own production of products traditionally supplied by Northcon: "*We need to have a dialog with Scanco about their sincerity of this move. Now we think it is mainly a tactical move, but we are not sure. Sharing our network pictures with Scanco could be one way of approaching them. This could be a good framework for discussion. 'How do you see the world?' 'We see it like this'. Scanco believe that we have higher margins that we actually have. Opening up to them will make them see our cost structures, and discourage them from setting up their own production*." The respondents say that in the future they will use this as a procedure for getting information about their customers: "*We will revisit our customers and further broaden our perspectives about the network and get information about the key players*." As such, Northcon has adopted network pictures as a tool not just for their sensemaking in preparation of making better strategizing decisions, but exchanging network pictures with interaction partners becomes an activity of managing in relationships, i.e. a networking tool as well.

5.3. From 2nd to 3rd intervention: How have the managers used the tools?

5.3.1. Key relationships continuously mapped

The managers have continued to use the tools introduced in the previous two sessions. They have made network pictures of the internal networks of their two largest customers (Scanco and Luxor)

and have completed a similar exercise for a third customer (Triplex). They have further created network pictures of Northcon's internal organization. Comparing these internal and external network pictures, they find it easier to assign resources, to handle key relationships and match the people in Northcon's organization with key people in the customer's organization. "*We now think in terms of networks*", one manager explains: "*how can we link people from our side to the people at the customer side?*" They have also presented their network pictures to the customers as a way to "*show how things should be organized and how things should work*", he continues. Another manager explains that they have created network pictures of the inter-personal level (personal relationships) and the organizational level (inter-organizational relationships). This has made them realize that they had weak ties to the top management of the customers' organizations in the first place. Making inter-organizational network pictures further revealed that there were important actors, which they needed to define as part of their network, such as the Stock Exchange and the political establishment. They have also created network pictures of future scenarios.

5.3.2. Failure to predict main customer's decision to integrate production vertically

The main change in Northcon's customer relationships is that Scanco has set up its own production facility in direct competition with them. This means that their largest customer has now become a competitor, and Northcon's market share has fallen as a result. At the same time, Northcon and Scanco need to be on good terms, since Scanco is a global actor and still buys volumes from Northcon when they have low capacity, or require special product features that they do not produce at their new plant. This move came as a big surprise to the management team at Northcon and they discussed at great lengths why they did not foresee this move: "*Why did we not anticipate this? We discussed this as a threat at our previous session with you in 2012, but we did not believe that Scanco would actually do it. We thought they needed more time, but this seems not to be the case.*

Even though we had good connections within their company, this information did not filter through to us. Our contacts didn't even know about it, only a small number high up in the system knew."
Apparently, the networks that Northcon were connected to inside Scanco's organization did not have access to this level of information.

5.3.3. Ties to other customers strengthened as a result

Scanco's move has in turn changed the way Northcon works with Luxor, their other main customer. Luxor has realized that it needs to strengthen its ties to its main supplier because their main competitor, Scanco, is now vertically integrated and produces its key products in-house. Scanco is thereby in a better position to serve its industrial end-customers because it has direct access to and control over its production technology. Luxor faces similar challenges, and has consequently involved Northcon in the relationships with their end-customers. This has broadened Northcon's network picture: "*Previously we did not position ourselves in terms of the customers' customer, or the end user. Our contact stopped with our customer. But now we have closer ties also to the customers of our customers, because we are an important part of their brand. We have repositioned ourselves in their network. This has been an important learning process for us. We have also become a better supplier for Luxor. When you change the picture of your network, you also change the idea of your own position and what you can achieve. When Luxor works closely with their customers, we need to be invited into this process. Luxor has a good knowledge of their customer's needs, and we can help them become a better supplier if we all become more connected.*"
Apparently, this has been a reciprocal process where Luxor's has challenged Northcon's network picture and *vice versa*.

5.3.4. Ties to established customer used to create value for new customer

Another interesting way in which Northcon has used network pictures in managing their relationship with Luxor, is to bring Luxor into contact with Triplex, a potential new customer of Northcon. In mapping their key relationships and the associated resource flows, Northcon realized that Luxor and Triplex could benefit from having a closer connection. Subsequently Northcon established a forum where managers from the two customers could meet, discuss and learn from common challenges related to using products provided by suppliers like Northcon: "*Our aim is to make Triplex aware of the benefits that our products have by talking to an established customer that has more comprehensive use of our products. This has helped, but it takes time.*"

5.4. From 2nd to 3rd intervention: What insights have they gained and what actions have they taken?

5.4.1. Increased understanding of network complexity and embeddedness

It is apparent that the action research process has helped the managers to broaden their perspective on relationship structure and interaction content, and this has impacted on the way they do business. One manager explains that his greatest insight is that "*…now I realize that there are more layers in a relationship, and there are more contact points/connections around our customers.*" Another explains that "*…my greatest insight is an understanding that there are many layers in a relationship, and that relationships are complex. I cannot make a list of all the things we are doing differently now compared to what we did previous to the sessions, but this is in the back of our minds every day, and we need to take this into consideration when we do business.*" Thereby, the managers have a better understanding of how their relationships are connected to a wider network: "*Relationship management is something that we have done for a number of years, but using these tools and creating maps of our customers, of our ties to the customer and other actors connected to our customer, we discover other points of entry to our network. We have discovered that the*

cheese has more holes than one...!" The managers have also gained new insight into the process of completing network pictures. One of the managers explains that: "*You must have exact knowledge about the various circles you draw in your network picture. You need to know exactly what these actors can provide. A network has dynamism and an energy that can create something. You need to know what you want from your network.*"

5.4.2. New network connections identified

Moreover, it is apparent that creating network pictures of Northcon's ties to their main customers has enabled them to see possibilities for new network connections, thus strengthening their network position: "*We are now working with other suppliers, together with our customers. This is new to us. And we cooperate on different levels. We are to a greater extent connecting other actors to help us give information about our products, or demonstrate how our products may be used. Thereby we can create more value for our customers. This is very useful. We connect others to our network, and we get introduced to other networks where we can have an impact. We realize that a lot of companies want to cooperate with us. They see that there is an added value in doing it this way.*"

5.4.3. New perspectives on network processes

The move by Scanco to set up its own factory clearly has raised some vital questions concerning how Northcon should handle this new and complex situation. The process has given the managers new perspectives on co-opetition (Bengtsson & Kock, 2000). One manager explains that: "*We have seen that there are ways you can cooperate without necessarily revealing your business secrets. We have to find such areas together with Scanco. Instead of cooperating in areas of our key competences, we have to seek out areas where we can benefit each other.*" Another manager adds: "*We cooperate on research and development. We have established a research facility together with*

Scanco and another supplier of technical components. Here we develop new product prototypes. We will maintain this relationship, but have to be aware of what information we disclose. The challenge in this network is how to do business with a competitor. We discuss this at length."

Table 2 presents an overview of the results.

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Insert Table 2 about here

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6. Discussion of Results

Building on the findings presented above, our discussion of the main results is structured around answering the three research questions outlined at the start of the paper: 1) Do managers perceive network pictures as a useful tool in practice to make sense of their business environment?, 2) How do managers express and utilize their network pictures?, and 3) How do network pictures translate into managerial analyses, networking options, and strategizing actions? The first two research questions mostly concern network picturing, i.e. what the managers *see or perceive*, whereas the third research question concerns what managers *do* based on their insights, i.e. strategizing.

Overall, our results suggest that network picturing as well as strategizing is an unfolding process (see fig. 1). Whereas earlier studies have tended to look at network pictures as snapshots, mainly because network pictures are not dynamic in themselves (Henneberg et al., 2006), our process research design has facilitated an understanding of how insights based on network picturing unfold over time. On a general level, our results suggest that we can identify three distinct phases where the group of managers have gained increased understanding, which in itself leads to new

strategizing activities. These are termed the *Comprehending*, *Expanding,* and *Amending* phases; note however that this is the researchers' interpretation of how such a process unfolds. The resulting figure 1 does not imply a directional development, and we recognize that the unfolding process of network insight is rather unpredictable, depending on the numerous feedback loops that occur, in line with Mouzas et al. (2008).

Insert Figure 1 about here

In answering the first research question, our findings indicate that the managers find both the theory and the tools particularly applicable to their strategic decision-making about how to handle their customer relationships. Using network pictures to map their connected relationships proves to be a practical tool and a meaningful theory-in-use for the managers, who state that they have gained a broader perspective on how their relationships are influenced by other actors. Several of the respondents state that by using network picturing they have become more aware of the complexity of the relationships, and that relationships have several layers. The results further suggest that network pictures and the associated network picturing activities transform tacit into explicit knowledge (Nonaka et al., 2000). Furthermore, knowledge is then transformed into higher-level collective beliefs by the process of interaction between managers as well as interactions with customers' managers. This has been termed network insight in the context of strategizing in business networks (Mouzas et al., 2008). As such, our action research and process-based methodology initially corroborates the practical usefulness of the concept of network pictures as theories-in-use for managers.

In particular, the managers reflect on the insight gained from creating and recreating network pictures, and what this means for their strategic options. One of the respondents neatly encompasses this: "*When you change the picture of your network, you also change the idea of your own position and what you can achieve.*" This suggest that network pictures are shaped by interactions which again shape new network pictures, in line with Ford et al.'s (2011) framework of *managing in networks* (i.e. the interrelationship between network pictures, networking, and network outcomes). It is also notable to see that managers bring their customers into this exercise. This gives them the opportunity to verify their network picture, and also as a way to discuss the current challenges to the relationship, and how these can be mutually solved. This exercise helps them to get better information about the network, and enables them to create a more 'complete' network picture. This is a good example of how a company can shape a common understanding of a network or a 'Networked sense-of-Us', in Huemer et al.'s (2004) terms. Overall, mapping the key relationships and connected relationships enables the managers to see connections that they have not previously been aware of, and they see this as a useful exercise. Thus, network picturing as a strategic tool provides managerial value.

Secondly, figure 1 provides a process overview of how managers use network picturing in terms of identifying different phases of development of network pictures, thereby answering our second research question. In the first phase, the managers are concerned with collectively *comprehending* their own and their customers' organizations. Here the network pictures are used to understand the organizational dimension, and how the relationships with key customers are organized. Therefore, initially managers use a very reductionist approach to network pictures, i.e. choosing a very narrow network horizon, which focuses exclusively on direct customer relationships and primarily on the activity bonds related to interpersonal relationships between the focal company and its main customer contacts. During this process, the managers gain an increased understanding of how the

relationships can be utilized and strengthened. In the second phase, the managers are concerned with picturing the relationships to connected actors, thus they are *expanding* their insight and are building a more complex network picture. As such, the network horizon widens and more complex resource ties and activity links are incorporated in the network picture. Here, our case managers gain new perspectives about how their relationships are connected to other actors including indirect network partners, and are thus able to better understand their network position as well as networking options. In the third phase, we see that the actors are both actively and reactively involved in changing and realigning their relationships, thus *amending* and thereby reshaping their network picture. This is a consequence of managers perceiving unexpected network outcomes (one of their main customers becoming a major competitor), which was not anticipated in their expanding network picture. As such, this outside 'shock' made it imperative to change (i.e. amend) their network picture based on their realization that they did not include important interpersonal relationships with the customer company in their understanding of the network. Following this amended network picture, some relationships are strengthened, some relationships take on new forms, and some serve as bridges to other relationships. Thus, the managers actively seek to change their network position and are reconfiguring their network as a result. Throughout this process, the managers develop a more nuanced and detailed understanding of their network and the connected actors, and they are actively engaged in networking activities. However, this process is dynamic and messy, and includes incidences of re-evaluating network pictures in light of often unexpected network outcomes, thereby complementing Ford et al.'s (2011) concept of managing in networks. Through the developing phases of network picturing outlined in figure 1, managers in the focal company are now able to better understand their customers' internal decision-making processes and they are in a position to correct misunderstandings, e.g. about product quality, which has previously restricted usage of their products in the customers' production process. They have

successively become more aware of distant actors (indirect network partners), which means that they have broadened their network picture and their scope of the network part of the network picturing process. Interacting with key decision-makers has given them access to indirect actors such as non-governmental organizations, political organizations and research institutes, which again broadens their network picture. Furthermore, the management team has become more aware of how they interact with second-tier customers (the customers of their customers). This has created new resource interfaces in terms of knowledge transfer and new network connections, thereby allowing for bridging strategies (Henneberg et al., 2009). Overall, issues around where to draw the *network horizon* as part of network picturing (Holmen & Pedersen, 2003) relate the underlying rationale of managers' use of network pictures: starting initially with a more reductionist perspective which is expanded and amended over time.

Thirdly, in relation to the last research question regarding how the focal company strategizes in terms of translating network pictures into managerial actions, the most interesting finding is perhaps that the managers in this study have moved from a relational perspective to a network perspective in their dealings with their customers: "*We now think in networks*", as one of the managers explains. Consequently, they also start to strategize in networks. One aspects of this relates to the fact that Northcon has changed the model for its sales organization. The network picture interventions have helped the managers realize that they needed to organize their marketing activities in a way that reflected the complexity they identified in the course of the research process. Another evident finding is the organizational learning that has taken place. The ready-made assumptions about their customers are challenged, as one respondent puts it. For instance, some of the people in the organization have started to approach customer seminars and teambuilding exercises with an attitude to network and influence possible decision-makers. Previously, this was seen as a get-together for the customers' shop-floor representatives. Now, this event has been

extended to include people from the entire organization that enabled networking on a large scale. Overall, the focal company's strategizing activities have allowed them to improve their network position in terms of their power centrality and relevance as an actor.

However, the process of network picturing and strategizing indicates some of the difficulties in using network pictures as a strategizing tool. The network picturing in the first and second intervention phases did not reflect the possible impact of a major customer changing its sourcing strategy, and the imminent changes this created for the connected relationships in the network. The respondents mentioned this briefly during the initial discussions, but they did not take this threat seriously. Therefore, the focal company did not engage in certain strategizing activities that could have counterbalanced the particular customer's change in sourcing strategy. In retrospect, the managers realized that they did not have connections to people in the customer's organization that could have verified this threat. This suggests that network pictures both enable and constrain the strategic options available. This further highlights the importance of interacting with actors who are able to enrich your network picture, and several of the respondents present this as one of the main insights (Mouzas et al., 2008).

As a consequence, our findings contribute to our knowledge of the interplay between cognition and action (network picturing and strategizing), a conceptually as well as managerially under-researched area (Laari-Salmela et al., 2015; Mattsson et al., 2015). In particular, we show the usefulness of network pictures for managerial practice. Through our applied action research methodology, we demonstrate that strategizing concerns choices about how to interact with, and mobilize as well as influence, other actors through interconnected business relationships. Network picturing, i.e. how managers relate perceptions about their business network to decision-making and strategizing activities, thereby becomes a basic component of business network strategizing. Araujo et al. (2003) argued that firms are multi-faceted entities and the definition of their

boundaries depends largely on the aims and purposes of the observer. Our study indicates that aims and purposes, which supposedly influence boundaries, are shaped by the interactions taking place through network picturing. That is, an actor's aims and purposes are developed through network picturing; firms and relationships are 'made' in such processes where managers create and recreate their understanding of the network by interacting with one another. Network picturing is an analytical approach that concurs with Normann's (2001) title "*Reframing business: when the map changes the landscape*".

The network picturing phases described in figure 1 differ profoundly from the fundamental distinction made between the external and the internal environments found in classical strategy analysis (Achrol, 1991; Gaski, 1984; Glazer & Weiss, 1993; Pfeffer & Salancik, 1978; Quinn & Murray, 2005; Stern & Reve, 1980), where it is commonly suggested that a company should match its internal resources to its external environment (Ansoff & McDonnell, 1988; Menon et al., 1999). Whereas a SWOT analysis bridges these distinctions in a static manner, network picturing is an ongoing process analysis that in itself transforms perceptions of 'inside' and 'outside'. Moreover, in our case the network picturing process did not 'only' result in awareness and a broader view of the network, it also resulted in qualitative changes including perceptions of value creation and knowledge flows. It added to the network identification processes (Huemer et al., 2004) by influencing how others perceive boundaries and identify within the network. Correspondingly, Ellis and Ybema (2010) observed that managers discursively mark different self/other boundaries that position themselves, and their colleagues, competitors, customers, and suppliers either as 'inside' or 'outside' the organization, market, relationship, or field of expertise. They noted that such 'circles of identification' contract or expand depending on managers' boundary work. Network picturing is a systematized and explicit way of visualizing one's network identification; it can thereby be seen as bridge between identification and strategizing.

7. Managerial Implications

In many ways, the managerial implications of network picturing and strategizing are addressed throughout this paper, as we have demonstrated how managers use this concept to aid decisions about strategic options and perceive new networking alternatives. This is due to the chosen action research method. For instance, our initial process tool presented in the Appendix (relating to several process steps: 1. define key relationship challenge, 2. analyze relationship dimensions, 3. describe connected relationships, and 4. analyze strategic options), may be a particularly useful starting point for managers in structuring knowledge about network boundaries and subsequent strategizing options. Our paper demonstrates that managers have found this step-wise exercise to be helpful when gaining new network insight and strategizing. However, our discussion indicates that network picturing also is a complex activity, because companies have numerous interfaces and connected relationships. Our study thereby shows that when applying these perspectives in the daily business setting over an extended period of time, the managers have refined this process in order to be applicable to their business environment. The initial concepts presented in the Appendix may be seen as an input to this process (the tools and perspectives we as researchers provide), whereas the findings presented in figure 1 represents an output of the process (how the group of managers applied these perspectives). We have found that this transformation from input to output happens in three phases: a first phase where the managers comprehend their network, a second one where they expand their network horizon, and a third one where they amend or reconfigure their network. This suggests that the network picturing processes may indeed be muddled and recursive because collective learning constantly takes place, which again prompts new actions. Figure 1 shows that there is a relationship between the insight gained during the time we studied the group

of managers in question, and the subsequent decisions that these managers took about their networking options.

Network picturing and the associated strategizing activities thereby have the possibility to practically complement the existing 'strategy tool box'. Our study additionally presents a useful illustration of how strategic options, which are usually limited to an actor's individual network picture, can be made to emerge collectively. Such an extended network picture is only likely to evolve by managers interacting with others; by working jointly and discussing network pictures internally in the organization, with outside customers and other connected actors. This suggests that relational capabilities and boundary work become even more accentuated than classical strategy tools would indicate. Network identifications visualized and made 'concrete' by network pictures arguably improve the capacity to influence how other actors perceive boundaries and identify with the network. From a practical strategizing viewpoint this is essential, since it can be used to place oneself in a constructive position in the network. Although simplicity is an advantage with the classical SWOT approach or other related strategic assessment tools, managers are encouraged to shoulder the complexity of the network picturing approach. The rewards may be radically different views of the network and of how value can be created or captured within and beyond its fluid boundaries.

8. Limitations of Study and Suggestions for Further Research

One obvious concern that can be raised about our research design is that it may seem deterministic in the sense that, as part of our interventions, we have deliberately given the managers the concepts that we later report on. As such, action research is not value-free (Ozanne & Saatcioglu, 2008; Reason & Bradbury, 2001). We as researchers take an active part in constructing the phenomena we later investigate. A follow-up study focusing only on the managers understanding of their

subjective environment and their subsequent decisions, without reference to theoretical tools and perspectives as we do in this paper, may indicate whether our results are general to managers or limited to the frame of reference that we use in this study. Secondly, our data relies on a limited set of observations at a given period in time. Even though we have used a range of research tools and several researchers have been involved in the data collection and analysis to ensure validity, with particular reference to specific types of validities relating to action research, care should be taken when generalizing and building theory from one particular case. For instance, a study involving companies from several industries, may contribute to the generalizability of our results. Thirdly, our study is longitudinal and we have intervened in the process at three distinct points in time. We are content to have covered the participants' recollection and description of events over this period, but it may also be possible that the respondents would have had different interpretations if we approached them at other time intervals. For instance, if we had conducted the final intervention earlier, our data would not have covered the decision by one of their main customers to build its own factory. A study involving several points of contact at regular intervals will probably give a more nuanced picture. Finally, we rely only on the observations of one company. We have not conducted interviews with the other actors mentioned in this case, such as suppliers, customers and competitors. Dyadic interviews may provide a richer description of how our focal company managed in this network, and verify whether the networking effects appeared in the extent to which the respondents describe them in our interviews and observations. Still, as we are interested in how our respondents interpret their environment, and what actions they take based on their understanding, this understanding can never be verified objectively, neither has this been our intention.

9. Conclusion

This paper has been concerned with the interplay between cognition and action; how managers understand their surrounding network, and what strategic actions they take based on this understanding. To do this, we have applied a novel research design based on process research and action research methodology. We have introduced a group of managers to several theoretical concepts aimed at broadening their understanding of industrial networks, and we assessed in a stepwise manner how they have put this theory into practice.

Our findings contribute to the existing literature on network pictures and strategy. The results suggest that managers find network pictures, and the related process of network picturing, useful as a way to understand the mutuality or reciprocity that their business relationships depend upon. Thereby, our results imply that the network picturing exercises help managers to better structure their knowledge of their surrounding network and consequently help them to perceive and synthesize various possible strategic options. This adds to our knowledge of how managers' perceptions aid their decision-making processes, which is an area where more empirical and theoretical development is called for (Mattsson et al., 2015). Our results further indicate that network picturing is an evolving process by which managers increasingly gain an understanding of their environment and the available options, which in itself leads to new strategizing activities. However, this process is a dynamic and messy exercise, including re-evaluating network pictures in light of unexpected network outcomes, where collective learning constantly takes place, which again prompts new actions. In the field of strategy, network picturing may be one way to understand managers' perceptions of the boundaries of the firm and how this understanding affects their decision-making (Araujo et al., 2003; Normann, 2001). Network picturing thereby differs from the fundamental distinction between the external and the internal environments commonly found in classical strategy analysis (Achrol, 1991; Gaski, 1984; Glazer & Weiss, 1993; Pfeffer & Salancik, 1978; Quinn & Murray, 2005; Stern & Reve, 1980). Whereas a SWOT analysis bridges these

distinctions in a static manner, network picturing represents an ongoing process analysis that in itself transforms perceptions of the 'inside' and 'outside' of an organization. Moreover, our case suggests that network picturing processes do not only result in awareness and a broader view of the network, they also facilitate qualitative changes within the focal firm including new perceptions of value creation and knowledge flows. Network picturing thereby creates new network interfaces, or boundaries, which again prompt new strategizing options.

Appendix A

Questions and themes used to start off the network picturing and strategizing decisions process during first intervention:

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1. Define key relationship challenge

This stage starts with defining a crucial relationship challenge that needs to be addressed, collectively agreed by the relevant management group. The challenge may derive from a problem related to the resource dimension, e.g. can our resources be utilized better?, or it can be related to the activity dimension, e.g. can we perform our operations more efficiently?; or it is about the actor bond dimension, e.g. can our cooperation with key partners be improved?

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2. Analyse relationship dimensions

This stage involves expanding the analysis of the key relationship challenge to include the interplay between all three ARA-dimensions, e.g. how do the resource ties, activity links, and actor bonds mutually affect each other? This exercise will provide an overview of the *current* status of the relationship, but additional insight may be gained if questions addressing the *history* of the relationship are included, e.g. why do we have this relationship in the first place? What have been the key challenges so far? Regarding the *future* of the relationship, e.g. what involvement do we want to have ? What are the opportunities for and threats to the relationship? (For a similar relationship assessment exercise, see Ford et al., 2011).

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3. Describe connected relationships

This stage starts with picturing the network of connected relationships affecting the key relationship. The ARA-concept may be used to detail the network picture. Insight may be gained by asking relevant questions such as: How is this relationship tied to other relationships? What is the interplay between this relationship and others? What are the key interdependencies affecting the focal relationship? Can this relationship be strengthened by a different combination of resources and activities in connected relationships? What happens in the relationship if there is a change in the connected relationships?

4. Analyse strategic options

Using the network picture, possible strategizing options may be derived by asking questions such as: What options do we now perceive? How do we change the way we manage our relationships? What internal changes are needed in order to achieve this? How should we involve our partners?

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Table 1: Research process design and content

Intervention phases	Intervention content	Research tools used	Participants
First intervention phase (2011)	**Main theoretical perspectives introduced:** • The Interaction model • The ARA model **Main tools used to conduct exercise (see Appendix A)** • Network picture of focal relationship • Network picture of connected relationships (enabling as well as hindering) • Network picture of network dynamics	Individual and collective network pictures Group discussions	Company senior management team, consisting of 20 people representing marketing, sales, product development and finance
Second intervention phase (2012)	**Short repetition of main concepts from the first intervention** • The interaction model • The ARA model • Network pictures **Key questions for group discussion** • Report and description of how the group has worked with these perspectives and tools • Adaptations and changes of the tools by the managers • Insights gained and actions taken	Group interviews Participant observation	Seven managers representing HQ and three sales regions
Third intervention phase (2014)	**Key questions for in-depth interviews** • Changes and current status of focal relationship • Insights gained and actions taken • Use of conceptual tools such as ARA model and network pictures	In-depth personal interviews	Four managers from HQ and sales regions

Table 2: Summary of key results

Use of key concepts	Insights gained (cognition)	Managerial decision-making and networking options (action)
From 1st to 2nd intervention phase		
• Key relationships with two major customers analyzed • Network pictures of ties to external actors created • Network pictures of customers' internal organization created • Customer included in exercises to verify network picture	• Broadened horizon, sees a "bigger picture" • More distant network actors identified • Better understanding of customers' internal organization and decision-making processes • Customer better informed about product capabilities and usage • NPs used as a strategy tool • NP mapping seen as a complex process	• Improved contact and communication with key people at customers' organization • Relationships to key people strengthened • Correct usage of Northcon product improves customer value • Improved product efficiency • Better informed about customers' decisions and way of thinking • Sales organization reorganized from Key Account Management to regional sales networks
From 2nd to 3rd intervention phase		
• Key relationships to customers continuously analyzed using NP concepts • Mapping of internal and external customer relationships • Third customer included in exercise	• Have adopted a "network view" to their industry • Understand the richness and complexity of business relationships • Distant actors in the network identified and approached • New network connections and networking options identified • Failed to predict that a major customer decided to build own production facility due to weak relationships to top management • New perspectives on cooperation and competition	• Easier to handle key relationships, assign resources and match people in customer organization • Ties to other customers strengthened because of Scanco's decision to produce internally • Closer ties to customers' customer mean better tailoring of products and value creation • Forum established to enable learning between old and new customers • New customer approached with help of established customer • Broader interaction with key customers in terms of research and development • Network position strengthened

1. Comprehending phase: Picturing customer organisation

Key characteristics
- Understanding internal customer organization (restricted network horizon)
- Mapping key relationships (particularly actor bonds on interpersonal level)
- Sees customer in a new context

Key strategising activities
- Direct interactivity with customers
- Realignment of internal organization structure with external relationships

2. Expanding phase: Picturing connected actors

Key characteristics
- Sees a larger picture (expanded network horizon)
- Increased complexity of relationship dimensions (incoporating resource ties and activity links)
- New perspectives on customers and indirect connected relationships

Key strategising activities
- Relational content alignment and increased value for connected actors
- Improved network position in terms of power centrality and relevance as an actor

3. Amending phase: Picturing network dynamics

Key characteristics
- Reshaping of network pictures (Reinterpretation of network horizon)
- Reacting to unexpected network outcomes
- Developing fine-grained understanding of relationship dimensions

Key strategising activities
- Further improving network position by engaging and re-engaging in multiple relationships
- Reconfiguring network by connecting with other actors
- Repositioning in terms of role vis a vis main customer/competitor

- **Network picturing:** More nuanced and detailed understanding of network and connected actors through recursive re-evaluation and amendment of network pictures
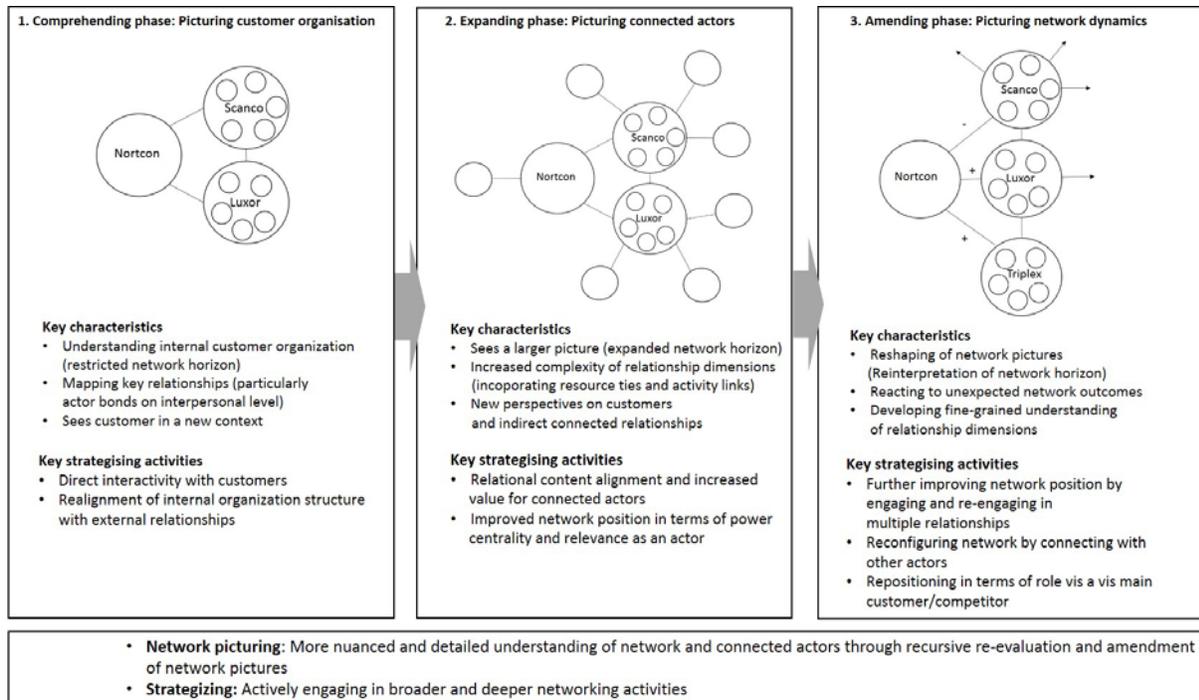- **Strategizing:** Actively engaging in broader and deeper networking activities

Figure 1: Network picturing and strategizing phases