Anssi Jussila

THE FORMATION AND DEVELOPMENT OF STRATEGIC BUSINESS NETS IN THE CONTEXT OF A MEGAPROJECT

Master’s Thesis
Department of Management and International Business
October 2013
This research examines the formation and development of strategic networks in the context of a megaproject. It combines business network and megaproject related research, and does so by examining strategic networks forming and developing between local companies that are potentially utilized in a nuclear power plant construction project in Northern Ostrobothnia, Finland.

In order to be able to compete for contract opportunities in the context of the plant project, local companies may seek to form strategic networks to enhance their competitiveness against larger national and international competitors, and to share project related risks. This research aims at providing insight into the formation and evolution of these networks by exploring the factors influencing strategic network formation in this specific context, by identifying the types of forming networks, and by examining the parts network management and network roles play in the studied phenomenon.

The research is qualitative in nature. A single case study approach is chosen to provide real-life data of the studied phenomenon, where the megaproject serves as the case and the identified strategic networks function as embedded units of analysis. A critical realist perspective is assumed and an integration of context and explanation is sought through contextualized explanation. A set of focused interviews serve as the primary data collection method.

Various factors affecting strategic network formation in this specific context were recognized. The factors arising from the megaproject, potential strategic network and from the potential network member itself can either facilitate or hinder the formation of a network in the context of the megaproject. Several forming or planned strategic networks were also identified, categorized and described, thus providing real-life data on the studied phenomenon. Network roles and management within these networks are also discussed, providing insight into the ways in which the network members and their actions influence the formation and development of the networks. Finally, a framework describing network formation and development in the context of the megaproject is presented. The formation of strategic networks is limited by the ambiguity concerning the project specifications prior to the selection of the final megaproject configuration. At this stage, the potential network members can take initial, however limited, steps towards forming strategic networks. Once the actors are fully informed, and if the formation factors favor the formation of a strategic network, the actual network can be formed. The network will continue to evolve, and it does so through changes in the network type and network roles, and through the exercised network management.

This research gives insight into the prerequisites, conditions and other factors affecting the formation of strategic networks in the context of construction megaprojects, illustrates development of these networks, presents the benefits and limitations of the said networks, and discusses the management and actor roles within the networks. The contributions can be used to guide managerial attention towards relevant issues in strategic network formation and development. Though similar issues are bound to be relevant in other construction megaprojects, the overall generalizability of the findings still calls for further testing.

Keywords

Strategic Networks, Network Evolution, Network Management, Network Roles

Additional information
Contents

Abstract

Contents

Figures and tables

1 INTRODUCTION

1.1 Theoretical and contextual background

1.2 Aim and research questions

1.3 Research approach and structure

2 MEGAPROJECTS AND BUSINESS NETWORKS

2.1 The features and peculiarities of megaprojects

2.2 The concept of business networks and networks with strategic intent

2.2.1 Business networks in general

2.2.2 Strategic networks and their potential

2.3 Megaprojects as business networks

3 STRATEGIC NETS: TYPE, MANAGEMENT AND ROLES

3.1 Classifying strategic business networks

3.2 Creation and development of strategic business networks

3.3 Managing strategic business networks

3.3.1 Levels of network management

3.3.2 Managing exchange relationships

3.3.3 Managing focal business networks

3.4 Actors’ roles and positions within the network

3.5 Network evolution framework

4 METHODOLOGY

4.1 Research methods

4.1.1 Methodological considerations

4.1.2 Focused interview as a data collection method
FIGURES

Figure 1. Strategic network types and features, adapted from Möller and Rajala (2007) and Hermes (2011)………………………………………………………………………………27

Figure 2. Strategic network evolution framework, partly adapted from Möller and Rajala (2007)………………………………………………………………………………42

Figure 3. Four methods of theorizing from case studies adapted from Welch et al. (2011)………………………………………………………………………………43

Figure 4. Factors affecting the formation of strategic nets in the context of Hanhikivi 1………………………………………………………………………………61

Figure 5. Formation and development of strategic networks in the context of Hanhikivi 1………………………………………………………………………………79

TABLES

Table 1. Conducted interviews………………………………………………………48

Table 2. Project Hanhikivi 1 background and major events…………………………52

Table 3. A summary of the identified and presented nets……………………………69
1 INTRODUCTION

1.1 Theoretical and contextual background

Megaprojects have received only modest academic interest despite their huge societal impacts (van Marrewijk 2007). However, among Finnish researchers megaprojects, nuclear power plant projects to be more precise, have been rather visible in the past few years (e.g. Hellström, Ruuska, Wikström & Jåfs 2013; Sallinen, Ruuska & Ahola 2013; Ruuska, Ahola, Artto, Locatelli & Mancini 2011; Ruuska, Artto, Aaltonen & Lehtonen 2009). This is understandable, as after a long hiatus in the extension of Finnish nuclear energy production capacity (excluding efficiency gains related to technological enhancements and maintenance), the Olkiluoto 3 nuclear plant construction project was started in the year 2005. The project is still going on, and it has suffered from serious delays, governance issues and the budget has been significantly exceeded (see Ruuska et al. 2011; Ruuska et al. 2009), and with two new potential nuclear power plant projects in the making (Hanhikivi 1 in Pyhäjoki and Olkiluoto 4 in Olkiluoto), the interest towards these type of projects and their peculiarities is well founded and topical. Furthermore, given the size of these projects, they can have a huge potential impact on the local economies and businesses, which further highlights their scientific importance.

Unlike megaprojects, business networks and strategic nets have received a lot of academic interest in the past decades, and they have been studied from multiple different perspectives and various disciplines have contributed to network related research (Ojasalo 2004a). Despite the vigorous academic attention and research, there are still many theoretical and managerial questions left unanswered (Möller & Rajala 2007). Networks have become a more and more prominent part of the modern business world (Möller & Törrönen 2003; Möller & Halinen 1999; Alajoutsijärvi, Möller & Rosenbröijer 1999; Ford & McDowell 1999), as firms are forming interdependent network relationships in order to specialize and to gain capabilities, resources, new business opportunities and other benefits they would not be able to attain on their own (Achrol 1997; Gadde, Huemer & Håkansson 2003; Möller & Rajala 2007). Strategic networks are not meant to serve the needs of a single member firm or to solve a specific problem, and they are much more than a distribution or
supply channel of an individual company (Ford, Gadde, Håkansson & Snehota 2003: 5). All in all, networks have been changing the way economic value is created (Möller, Rajala & Svaht 2005), and they will remain as prominent research subjects for years to come.

Earlier studies converging megaprojects and networks have mainly focused on issues related to central project networks and their management (e.g. Hellström et al. 2013; Ruuska et al 2009; van Marrewijk 2007; Miller & Hobbs 2005; Hellgren & Stjernberg 1995 etc.). According to Ruuska et al. (2011), there is a need to emphasize a network perspective when examining the structures of complex multi-firm projects such as Hanhikivi 1 that have been usually regarded as hierarchical contract organizations. Large projects can be described as dynamic networks, in which multiple organizations are combining their capabilities and resources in order to satisfy the requirements of the project owner (Ruuska et al. 2011). In these projects there is a need to manage a complex internal network of suppliers, while at the same time acknowledging the network of external stakeholders (Ruuska et al. 2011). But as there are various actors that often have diverging underlying goals and objectives, and as megaprojects are more complex and risky than the more commonplace projects, the management and coordination of the project network may prove to be challenging (Ruuska et al. 2011; Miller & Hobbs 2005; Möller et al. 2005). Poor project management and coordination is linked with increased rate of project failure and other negative effects (Miller & Hobbs 2005). The overall project network and the way it is arranged affect the formation and success of potential strategic nets around the project, as the ways in which the project is organized and carried out may facilitate and steer the formation of said networks, as will later on be described. Therefore, issues related to the project network itself will also be examined and discussed, though they are not in the central focus of this thesis.

In the context of construction related megaprojects, such as the construction of a nuclear power plant, there is a need for a huge amount of labour, material and other resources, which presents large obstacles for the involvement of relatively small local constructor and industrial companies, while at the same time providing them with potential opportunities to join their resources and to seek new network related business opportunities and benefits. As smaller local suppliers, who may also lack
certain skills, resources and capabilities necessary for project involvement, are competing with large suppliers from other regions and countries as well, there are great potential opportunities to be gained through networking with other interested actors in the area. By entering a strategic network a smaller company can enhance the likelihood of gaining access to the project which in turn could lead to further business growth both domestically and internationally through references, new connections and financial boost. Also, the formed networks and gathered experiences could be used in other similar projects, and as Ruuska et al. (2011) argue, there is a need to start viewing projects as events or episodes within long-term partnerships and in shared history, rather than perceiving them as temporal arrangements. Especially due to their size and intricacy, megaprojects can have a significant impact on the lasting relationships between involved project partners. Furthermore, in traditional short-lived project-organizations achieved learning often dissolves as the project-organization is disintegrated, and thus the learning is not transferred to subsequent projects (Veenswijk, van Marrewijk & Boersma 2010). When the focus is on long term collaboration and continuity, interactive learning between project partners is made possible, and reductions in overall transaction costs can also be achieved (Grabher 2004).

Unlike the earlier studies, this research examines the strategic networks forming around a megaproject and its main project network, and focuses on the early phases in the formation and development of interorganizational strategic networks in the context of a megaproject. This is done by analysing the prerequisites and characteristics of the value networks forming around the Hanhikivi 1 power plant project, and by examining different actor roles and potential management activities within the networks. The focus is on networks formed by local companies operating in different business fields and in different project tiers, although the project network, its key members, and parties supporting the local companies are also examined and discussed, as they can have a significant impact on the formation of local strategic nets. Subcontractors never operate in isolation from rest of the project network, but are connected to it through varying relationships (Artto, Eloranta & Kujala 2008). Partanen and Möller (2012) note that the network building processes should be further examined from the perspective of network members regardless of their size or role. The organizations interviewed in the course of this study fall more
or less into the SME category, though one of the interviewed companies is a relatively large international organization. The main attention will be on network relationships lasting beyond the construction process of the nuclear power plant, though the completion of the construction phase may sever some connections, or otherwise cause major changes in the networks.

Business networks are in a continuous and interactive process of creation, evolution and dissolution (Halinen & Törnroos 1998). Halinen and Törnroos (1998) use the concept of network evolution as a reference to the dynamism and change within networks, and see it as highlighting the process nature of change and the context it relates to. By examining the formation and early evolution of strategic networks forming around Hanhikivi 1, valuable new information concerning the prerequisites, processes, deficiencies and pitfalls of strategic network creation in the context of megaprojects could potentially be acquired. This kind of knowledge and understanding could be helpful in facilitating the creation and ensuring future success of strategic networks, at least in this specific context.

The megaproject in question concerns the construction of a nuclear power plant in the town of Pyhäjoki, in Finland. The initiator of this project is a Finnish energy company called Fennovoima Ltd, which is owned by Voimaosakeyhtiö SF, whose owners consist of 60 Finnish companies operating in the field of industry and trade, while also including dozens of local electricity providers and producers. Fennovoima doesn’t seek to sell electricity directly to the market, but rather seeks to fulfil its owners’ electricity requirements at cost price and in proportion to the shares of ownership. The project has been named “Hanhikivi 1”, after the name of the intended plant location. (Fennovoima 2013.)

At this point it is still not entirely certain whether the nuclear power plant will be constructed or not. It is still highly possible that networking and industrial value networks start to emerge between local businesses, even if the actual construction project is never started. However, this does not mean that the networking has been all in vain, as there may well be positive network effects arising from the already formed value networks. The networks might continue to exist and revolve around other business projects, and they might also lead to new business opportunities.
within the networks themselves. If the power plant is built and everything goes relatively well, then the networks related to the construction of the plant itself are likely to be involved in other large construction projects for example in the Northern Finland, where there are other upcoming major projects such as the construction of new mining sites. Operating in a project of this size and complexity gives the network certain qualifications, references and overall preparedness to work in other large and similarly complex projects.

1.2 Aim and research questions

The aim of this thesis is to examine the formation and evolution of strategic business networks in the context of megaprojects. Thus by examining the strategic networks in this particular setting, the research seeks to contribute to both strategic network and megaproject research. As the project in question is still on a very early phase, and as the related strategic networks are either merely taking shape or are still on a conceptual level, the focus of this research will be on the early phases of strategic network evolution. Partanen and Möller (2012) acknowledge the need to further study the creation of strategic networks in more stable industries. The Hanhikivi 1 megaproject could suit this purpose rather well, as the forming strategic networks are likely to be relatively highly-determined due to the requirements set for building and managing a nuclear power plant. For example, there are often very strict technical standards and requirements on the construction, maintenance and operation of safety control systems in nuclear power plants (Kessides 2012). These requirements may have a great impact on the selection and acceptance of network members, on the required quality of services and materials, and on the emergence of related business opportunities etc. Furthermore, the construction process will require involvement from various relatively stable industries, e.g. industrial and infrastructure related construction, where the work itself, aside from the additional requirements related to documentation and work/product traceability, is very standardized.

The main research question deals with the process of formation and evolution of strategic networks around the Hanhikivi 1 project. In order to learn more about the formation of the networks in question, information concerning the prerequisites of strategic network formation within this specific context is required. Also, by
examining the characteristics and types of the forming networks, further information regarding the process of network formation could be obtained. In addition to the network type, the forming and existing network roles, and the nature of exercised network management affect the network formation and evolution, and must therefore be examined as well. The main research question is as follows:

*How do strategic networks evolve in the context of megaprojects?*

In order to answer the main question a set of sub questions is proposed. The first sub question concerns the prerequisites of forming strategic networks in the context of the Hanhikivi 1 project. As megaprojects differ from more conventional undertakings (van Marrewijk 2007) and are also far less common, the conditions affecting the formation of strategic networks in the context of a project of this nature need to be examined. Some factors might enhance the formation of strategic networks, while others might hinder their realization. Furthermore, the factors might affect the type, constellation and purpose of said networks, and influence related decision making both on the individual member and on the wider network level. The first sub question seeks to identify and examine the factors affecting strategic network formation in the context of Hanhikivi 1, and the question is as follows:

*What are the factors influencing strategic network formation in the context of Hanhikivi 1?*

The second sub question deals with identifying potential network characteristics and classifying the forming networks. Identifying and examining the nature of strategic networks forming around Hanhikivi 1 is an integral part of understanding the process of network formation in this context. Also, by examining the nature and the basic differences of the networks companies are involved in, managers can gain better understanding of the requirements induced by different networks (Möller & Svahn 2003). Diverging network types require different kinds of managerial attention and organizational forms, and the network actors’ positions and roles are likely to be easier to comprehend by understanding the underlying network value creation systems (Möller & Rajala 2007; Möller & Svahn 2003). Therefore, the second sub-question is as follows:
What types of strategic business networks form around the Hanhikivi 1 project?

The third sub question concerns the roles of the network members within the observed networks. By understanding the nature of the companies participating, or willing to participate, in a strategic network, and by gaining insight into their role in the network’s value creation, one will likely gain better understanding of the potential dynamism of the network formation and evolution processes. Furthermore, as Järvensivu and Möller (2009) point out, there is a need to recognize whether a generic set of network roles exists or not, and what are the required capabilities and resources to acquire those roles. Due to the nature and limits of this research, it might be challenging to identify widely generalizable network positions. However, the research can still contribute to related research by examining the network positions in this particular context. From the perspective of megaprojects, Hellström et al. (2013) suggest that the role of domestic suppliers in large projects is a matter that requires further academic attention. The third sub-question is as follows:

What roles do the actors involved with the observed strategic networks have?

According to Möller et al. (2005) and Möller and Rajala (2007), there is still a need for deeper knowledge and understanding regarding the management and behaviour of strategic nets, and Ojasalo (2004a) regards systematic network management approaches to be in their infancy. Möller et al. (2005) note that by examining the criteria and procedures of partner selection, distribution of roles and responsibilities, and coordination within specific value nets, we could gain better understanding of how the value nets function and of how they can be managed. By examining the way Hanhikivi 1 project and the related strategic networks could be managed, the research might also be able to contribute towards answering these questions. Also, the exercised management of a network may also affect its evolution paths and future structure, for as Heikkinen et al. (2007) point out, when a network actor succeeds in its efforts to influence the net, the net will be changed to some extent. Furthermore, the decisions made in the early phases of a large project may doom the project in the long run, or facilitate greater success (Hellström et al. 2013). Therefore, the fourth sub question is as follows:
13

*How can the observed strategic networks be successfully managed?*

### 1.3 Research approach and structure

To examine the formation and early stages of strategic networks in the context of Hanhikivi 1, a literature review on megaprojects and strategic networks is carried out, and roughly dozen organizations involved in the project and in potential strategic networks are interviewed. The conducted literature review will support both the interview and data analysis processes. The research is qualitative in nature, and a single case study approach is used, in which the Hanhikivi 1 will serve as the case, and the identified networks will function as embedded units of analysis.

The research structure advances as follows. The second chapter opens up the concepts of megaprojects and business networks, and discusses the relationship and overlap between the two. The concept of megaprojects is first discussed generally and from the perspective of nuclear power plants in particular. This is followed by a general level introduction to business networks, and the chapter also discusses the differences between intentional and emergent networks, and a definition of strategic network is also provided. The second chapter is concluded by pointing out the inherent connections between megaprojects and business networks. In chapter three, strategic networks are discussed in further detail by proving a framework for characterising and classifying business networks, and by examining and presenting existing literature on the creation and management of strategic networks, and on the roles within them. Furthermore, a simplified framework depicting strategic network evolution is presented. This framework includes three internal network evolution factors, namely network type, management and roles, that are examined to observe the development of the identified strategic networks. This is followed by a description of applied research methods, and in chapter five the gathered empirical data is presented, analysed and discussed. Finally, the research conclusions and suggestions for further research are presented.
2 MEGAPROJECTS AND BUSINESS NETWORKS

2.1 The features and peculiarities of megaprojects

Megaprojects can be defined as “large-scale capital investments focused on a single purpose” (Lehrer & Laidley 2008). They are multibillion-dollar undertakings, most often related to large infrastructure projects, such as transportation systems, electricity facilities, freeways, dams etc., that often have considerable social impact as well (van Marrewijk, Clegg, Pitsis & Veenswijk 2008; Lehrer & Laidley 2008), and they are distinguished from more conventional projects by their intricacy, size and the number of involved actors (van Marrewijk 2007). Various companies, different level authorities, and public organizations are usually involved in large projects, and there may also be more than one project owner (Grün 2004 via Hellström et al. 2013).

Even though megaprojects have become more commonplace in general, the estimations regarding their costs, schedules and the end results are still often highly inaccurate (van Marrewijk et al. 2008; Priemus 2010). The difficulties to estimate the total costs, related technology based risks, modifications to the project plans, safety and environmental concerns, and other project related risks, often lead to conflicts, ambiguity and failed coordination between the project members (van Marrewijk et al. 2008). The costs of megaprojects can far exceed the original estimations, as was in the case of TVO’s Olkiluoto 3 nuclear power plant project, which can cause large additional direct or indirect expenses to the parties involved. Originally in 2003, the cost of the Olkiluoto 3 plant was estimated at little over 3 billion euros, but due to significant delays and other project related problems the total costs have far exceeded the original estimations, the estimate from the end of 2012 being somewhere around 8,5 billion euros (Yle Uutiset 2012). The delays and increased costs also led to legal disputes between the project owner TVO and the main contractor AREVA (Lähteenmaa 2012).

Large construction projects usually involve considerable amount of risk and uncertainty (Hellgren & Stjernberg 1995), and they normally have a long time-horizon, which induces its own problems regarding planning and project
management. In such an environment, the outcomes and returns of decisions may materialize long after they have been made (Hellgren & Stjernberg 1995), and bad decisions made early in the project may eventually ruin the whole undertaking (Hellström et al. 2013). In the light of their research, Hellström et al. (2013) argue that the relationships that form, and the paths that are taken, on the early phases of the project, create the conditions for the structures and mechanisms of governance for the entirety of the project. Therefore, they see the formation and creation of relationship and commitment between key project actors as a crucial factor even during the early stages of a project. Still, project networks do evolve as the current project formation is tested and challenged, and as reformulation is deemed necessary (Miller & Hobbs 2005). The involved key project partners and the relationships and contracts between them can have a significant impact on the formation of strategic networks at different project levels, which will be further discussed in chapter five.

Social construction is a visible part in the forming of the project environment since different actors are seeking to create more or less stable conditions for themselves to operate in (van Marrewijk et al. 2008), which can also be seen as taking steps towards forming networks around the project. According to van Marrewijk et al. (2008), megaproject environments contain multiple rationalities and cultures, as different organizations operating under varying contractual arrangements bring with them their own interests, values and ways of thinking and doing. There is seldom one actor who would have the power to plan and control everything by itself (Hellström et al. 2013; van Marrewijk et al. 2008; Hellgren & Stjernberg 1995), and megaprojects should rather be seen as carried out by a set of collaborators (van Marrewijk et al. 2008). This increases the need and challenge for proper coordination of the project environment, or in other words the surrounding networks. Furthermore, as megaprojects bring together various competencies that are characterized by their particular, and often misaligned, rationalities (talk, decisions and actions), the role of coordination is even more pronounced (van Marrewijk et al. 2008). Even though the actors are likely working towards a certain mutual goal, they may also have their own underlying interests and agendas (Hellström et al. 2013). Hellström et al. (2013) regard the coordination and management of the multitude of complex activities within these intricate project networks as one of the major challenges related to large projects. Contracts alone are not enough to ensure smooth operation, and legal
disputes over their content are actually very commonplace within megaprojects (van Marrewijk et al. 2008). However, van Marrewijk et al. 2008 also point out, that even though control is essential in the context of megaprojects, too much of it can obstruct the formation of cooperation, commitment and trust between the partners, and also block the flow of essential information.

The construction of a nuclear power plant, for example, is always a costly and long-term undertaking. The socio-political environment, that is usually clearly present in the context of large projects (Hellström et al. 2013; Ruuska et al. 2011), is even more visible in the case of nuclear plants. The radiation and nuclear safety authorities are closely monitoring and influencing the planning and construction of nuclear power plants. Furthermore, nuclear energy is always a hot topic in political discussions, and people’s opinions regarding the production and overall use of nuclear energy are always divided to some extent. Governmental stakeholders have the power to either restrain or enable nuclear plant projects through various means (Sallinen et al. 2013). For example, the Finnish government announced in 2007 that they would not force cooperation between Fennovoima and the nuclear waste company Posiva regarding the disposal Fennovoima’s plant’s nuclear wastes (Kapanen 2007), leaving the question regarding the vital waste repository open. However, in the year 2012 the Finnish government, now led by another political party, informed that is was ready to force the two parties into cooperation (Taloussanomat 2012). Governments may also invalidate or cancel previously made decisions and commitments (Miller & Hobbs 2005), which can also cause delays and other problems to actors willing to participate in the project. Moreover, the public opinions have an influence on the governmental stakeholders, and Sallinen et al. (2013) recognize the public as an essential stakeholder in nuclear projects. Therefore, the opinions and views of external stakeholders must be taken into consideration also on the network level, as each actor may play a role in the formation of the overall public image of a particular project, or similar future projects.

Furthermore, the construction of nuclear power plants is not a frequent occurrence in Finland, as Olkiluoto 3 is the first such project in many decades (Ruuska et al. 2011). Ruuska et al. (2011) point out, that this has resulted in a void of learning, experience and capabilities regarding such projects, which in turn has led to a lack of
experienced suppliers. Therefore, many domestic actors require training in the requirements, standards and practices concerning the participation in a nuclear power plant project, which may seem like a daunting task for individual local businesses.

2.2 The concept of business networks and networks with strategic intent

2.2.1 Business networks in general

Networks and networking have always been part of all business activity, for they are essential components of doing business (Ford & Redwood 2005). However, research surrounding business networks is still relatively young, and even though the area has received a lot of academic attention in the past few decades, there are still major areas left unexplored. Organizations are always part of larger business systems, connected by dynamic social, economic, professional and exchange relationships, and should not therefore be viewed as isolated entities that could exist without the interference of other contextual factors (Gulati 2007: 1; Ritter, Wilkinson & Johnston 2004; Gadde et al. 2003; Gulati, Nohria & Zaheer 2000). Ford and Redwood (2005) argue, that when new companies are formed they are already part of an existing network, and that there are no new networks per se. Furthermore, the whole economy can be perceived as a network consisting of all kinds of organizations and relationships (Thorelli 1986), in which individual focal networks are embedded (Halinen & Törnroos 1998). In the complex contemporary business world, even the major multinational companies cannot hope to efficiently manage all value activities internally (Möller et al. 2005). E.g. globalization, deregulation, advances in information and communication technology, rapid innovation rates and diverse customer needs have reinforced the need and viability of network based business approaches to developing new assets and capabilities (Möller & Halinen 1999; Rajala & Westerlund 2007; Artto & Kujala 2008).

Networks have been superseding traditional market frameworks, and the ways in which networks affect dyadic relationships, and vice versa, have created new managerial concerns (Möller & Törönen 2003; Möller & Halinen 1999; Alajoutsijärvi et al. 1999; Ford & McDowell 1999). Furthermore, companies are increasingly focusing on their core competencies, while externalizing less important
value activities (Möller & Törrönen 2003; Rajala & Westerlund 2007; Achrol 1997), which has caused many large vertical manufacturing companies to make the transition into external and internal network structures (Achrol & Kotler 1999). Hinterhuber and Levin (1994) regard strategic networks between SMEs as having the potential to challenge and outmatch far larger competitors. In industrial networks, there has been increasing emphasize on interdependency and connectedness, which has reduced the roles of competition and the strategic aspect of winning rivalling companies, while increasing the strategic presence of building and maintaining relationships (Gadde et al. 2003). Therefore, the ability to build up strategic networks is widely seen as a major success factor for companies in the future (Partanen & Möller 2012).

There is a myriad of differing descriptions regarding networks, devised from various disciplinary and contextual viewpoints (Provan, Fish & Sydow 2007; Achrol 1997). Networks are often described as groups of nodes, i.e. network actors or positions occupied by them, that are interconnected by a number of relationships, and that are engaged in organized economic activities (Gulati 2007: 2; Brass et al. 2004; Håkansson & Ford 2002; Thorelli 1986). Networks may be loose or tight, depending on the depth, quantity and type of the relationships between the actors (Thorelli 1986). The relationships can have varying degrees of influence and they can take various forms, such as alliances, vendor relationships, customer relationships, personal relationships etc. (Gulati 2007: 2–3; Brass et al. 2004). The ties firms have to other organizations serve as sources of valuable information, resources, technologies (Gulati 2007: 3; Gulati et al. 2000) and other “collective benefits” (Möller & Svaln 2003). As networks are virtually boundless, there is a need to determine artificial boundaries when focusing on certain parts of a net. Alajoutsijärvi et al. (1999) point out, when examining business networks the question of where to draw the boundaries of a network is of key importance. As networks are virtually ever-extending, the line has to be drawn somewhere, e.g. according to the research’s scientific objective, or to match the perceptions of managers’ within the network (Alajoutsijärvi et al. 1999; Ford & Redwood 2005; Anderson, Håkansson & Johanson 1994).
2.2.2 Strategic networks and their potential

Möller et al. (2005) and Achrol (1997) point out that it is important to distinguish between the notions of networked organizations and network organization. As discussed earlier, all organizations are connected to external networks in one way or another and are, in essence, networks themselves (Ritter et al. 2004; Achrol 1997). Therefore, networks of organizations refer merely to groups with direct and indirect exchange relationships interconnecting the network members to each other (Möller et al. 2005). Even though these emergent networks are also results of intentional actions carried out by their constructors (Möller & Rajala 2007), Achrol (1997) argues that it is the quality and nature of the network relationships and shared values that set the borders of a network organization, and distinguishes it from the concept of “networks of organizations”. According to Achrol (1997), network organizations are characterised by dense, reciprocal long-term relationships and ties between the network actors, in which the actors have various responsibilities and roles, and by a shared value system that defines the roles and responsibilities within the network. Achrol and Kotler (1999) regard the network organizations as interdependent coalitions that are formed by individual firms or autonomous organizational functions, and that are not hierarchically managed, but are rather connected by lateral ties, reciprocity, mutuality, and by the shared value system. The “networks of organizations” perspective regards networks as nearly uncontrollable self-managing systems, and therefore, considers the network management role of individual network actors as insignificant (Möller & Rajala 2007; Ritter et al. 2004). The concept of network organization, however, emphasises the deliberate nature of networks, and calls for a need of efficient network management. Möller and Rajala (2007) emphasize, that both of these aspects are important in examining the behaviour of network actors, and in understanding the ways in which business networks are managed. Ritter et al. (2004) also see both emergent and deliberate nature of network activity as important, since firms face various situations and occupy various roles in different networks.

According to Gulati et al. (2000), strategic networks consist of vertical and horizontal interorganizational ties and relationships between suppliers, customers, competitors and other entities, that are both lasting and of strategic importance to the
network members. These ties include strategic alliances, joint ventures, long-term buyer-seller relationships and various comparable relations (Gulati et al. 2000). According to Möller and Rajala (2007), the underlying system through which the network creates value, i.e. the value creation logic of the network, is at the heart of understanding strategic business nets. Overall, a strategic network represents the notion of the network organization, and is formed of a set of dense, reciprocal and long-term relationships, guided by strategic intent, and connected by an overarching value system that defines the actors’ roles and positions. In the context of this study, strategic networks and strategic nets are used to describe specific interorganizational focal networks, limited by specified borders (i.e. as specific subsets of larger networks). These limitations are either clearly stated, or are apparent from the specific context. The concept of a value network is regarded as a synonym for strategic business network in the context of this thesis.

Strategic nets can allow firms to achieve great potential benefits that would be unattainable by the means of any single company (Möller & Rajala 2007). Therefore, the main research emphasis has shifted away from individually operating and competing companies, towards examining cooperative behaviour, networks of firms, and the interactions between network actors and different networks (Gulati 2007: 1; Möller et al. 2005; Achrol 1997). Networks are not only relevant in gaining access to new strategic actors and markets, and in acquiring market information, technologies, services and inimitable resources, but they also allow organizations to share risks, develop and maintain competitive advantage, outsource value activities, and to reach individually unachievable strategic objectives (Möller & Törrönen 2003; Gulati et al. 2000). Also, the experiences and learning attained from participating in networks and from networking activities are highly valuable, as they may enable firms to enhance their existing networks and to prepare for future networking engagements (Ford et al. 2003: 185-187). According to Dyer and Nobeoka (2000) networks can be much more effective in creating, transferring and combining knowledge than individual companies, if these activities are properly coordinated. Especially in networks where the members are from different fields of business, the combined perspectives and viewpoints may allow the members to recognize issues and opportunities they might have otherwise neglected. Nyström (2009) regards the business network theory as a mean to understanding how stability is maintained and how business opportunities
are leveraged within organizations through forming of business relationships. Furthermore, Gulati et al. (2000) also point out, that networks themselves can be inimitable sources of competitive advantage due to their unique and often inimitable compositions.

However, network relationships do not only provide new benefits and opportunities, but there are also constraints that restrict and guide the behaviour of companies within networks (Brass, Galaskiewicz, Greve & Tsai 2004; Ritter et al. 2004; Gulati et al. 2000). Certain relationships may prevent organizations from entering other promising networks, or be a hindrance to building new relations, and there is also the chance of getting locked in cumbersome relationships (Gulati et al. 2000; Hung 2002; Padova 2008). As Håkansson and Ford (2002) point out, the actions of individual networked companies may have effects on the whole network, and therefore companies cannot usually act on their own or in isolation from other network members. Due to network effects, the value creation in dyadic relationships may be highly dependent on other network relationships, and the value creation activities within a dyadic relationship can also have significant impact on the network itself (Möller & Törrönen 2003; Håkansson & Snehota 1995: 39). A company has therefore limited power and controllability over value creation within a network, depending on the overall network positions and distribution of power. As Artto and Kujala (2008) point out, the network actors may also be working towards different objectives and they may have diverging interests, which may cause inaction or power conflicts within the net as some actors try to enforce their own agenda upon the whole network. Competition for survival, growth and scarce resources can also lead to conflicts between the network actors (Thorelli 1986).

### 2.3 Megaprojects as business networks

As discussed earlier, the realization of megaprojects usually calls for a large network of actors that are connected through varying arrangements and relationships (van Marrewijk et al. 2008), and there rarely is a single organization that could dictate the project on its own (Hellström et al. 2013; van Marrewijk et al. 2008; Hellgren & Stjernberg 1995). Just as all business organizations are tied to the environment they operate in (Gulati 2007: 1; Ritter, Wilkinson & Johnston 2004), the actors taking part
in a large project are connected to other involved actors. These ties include different kinds of relationships and varying levels of interaction and relevance. The main project network and its extensions are essentially business networks themselves with potential non-business stakeholder involvement, and they are also part of the wider business network context.

Within the main project network there are various subset networks formed by actors operating in various project tiers. Some of these networks can be strategic in nature, while others may be temporal networks formed purely due to the requirements of the primary project network and because of the conditions set in the arrangements made at the top project levels, i.e. they are not formed out of a long-term strategic intent as such. Especially smaller actors can seek to combine their resources, capabilities and connections to enhance their chances of getting into the project, and to be able to take on larger contracts in the context of the project than they could on their own. Furthermore, as noted by Möller and Törrönen (2003) and Gulati et al. (2000), strategic networks can be leveraged to share risks, which tend to be rather high in the context of intricate megaprojects, and to achieve competitive advantage. By forming lasting networks that have the potential to operate in further similar projects, the experiences, knowledge, built and gained trust, and formed value systems can be transferred to these subsequent undertakings, which is normally absent in the case of temporal project networks (Veenswijk et al. 2010). As mentioned earlier, this is a potential source of significant competitive advantage, as a lasting network does not have to start from the scratch, saving both time and effort compared to newly organized networks. However, as discussed previously, networks can potentially have negative effects as well, which is naturally also true in the context of megaprojects.

All in all, megaprojects usually consist of intricate stakeholder networks, and many of the issues present in megaprojects are also relevant in the strategic network discussion. Thus megaproject and network research share common ground, which makes megaprojects an interesting area for network related studies. The next chapter will focus on strategic networks in further detail, while chapter five makes a return to the megaproject theme by discussing the identified strategic networks in the context of the Hanhikivi 1 project.
3 STRATEGIC NETS: TYPE, MANAGEMENT AND ROLES

This chapter discusses theories related to strategic network classification, management, formation and member roles and positions. First, a framework for classifying strategic nets is presented and discussed. Second, the creation and development of strategic networks is discussed. Thirdly, management within strategic networks is examined, after which the network member roles and positions are discussed on a general level. Finally, a simplified framework for describing strategic network evolution is presented.

3.1 Classifying strategic business networks

There are various classifications of business networks (e.g. Snow et al. 1992; Hinterhuber & Levin 1994; Achrol 1997; Möller et al. 2005). This thesis examines business networks by using the classification framework from Möller and Rajala (2007) that is based on analysing the underlying value systems of networks, while also discussing other related literature. Despite being somewhat abstract and based on ideal network types, Möller and Rajala (2007) regard their framework as being better suited for explaining the complicated nature and diversity of strategic business networks, and furthermore, they argue it offers clear insight into the creation and management of specific types of strategic networks.

According to Möller and Rajala (2007), every business net can be classified by examining the underlying system through which they create value, i.e. the limited value system of a specific strategic network (Möller & Svahn 2003). Möller and Rajala (2007: 898) define the value system of a network as the “set of specific activities carried out by the actors constituting the net”, and regard the activities as being based on the resource bundles in control of the network actors. These value creation activities are responsible for producing the network’s offering (Partanen & Möller 2012; Möller & Rajala 2007). Möller and Rajala (2007) also distinguish the level of determination as another key characteristic for classifying business nets. The level of determination within a business net refers to the extent of which the actors within the net are aware of the net’s value systems and of the capabilities of the net and its individual actors, and to which extent they are able to specify these activities
(Möller & Rajala 2007). The more specifically the value creation activities and roles of different network actors can be defined, the higher the level of determination is. The capability to recognize and understand the value activities within a network and their underlying capabilities, is directly related to how well they can be codified and communicated within the business net and between the network partners, which in turn affects the significance of different modes of learning and knowledge utilization within the net (Möller & Rajala 2007). This has profound effects on the types and level of required management and coordination, and on the efficiency of the cooperation (Möller & Rajala 2007; Möller & Svahn 2003). If all other factors remain the same, an increase in determination will lead to less uncertainty, and the demand for management within the business net is reduced (Möller et al. 2005).

Building on the work of Möller and Svahn (2003) and Möller et al. (2005), Möller and Rajala (2007) present a network value system continuum for strategic interorganizational networks, along which different network types can be identified. Möller and Rajala (2007) identify three generic value systems that all have their unique value creation logic as well as differing means of management.

The first network value system category is called “current business nets”, and it includes both vertical demand-supply nets and horizontal market nets. The value systems within this category are relatively stable and their value creation activities are distinctively defined, and the roles, offerings and capabilities of the network actors are quite specified (Möller & Rajala 2007). Vertical networks are based on maximizing vertical synergies through forming partnerships between independent firms (Achrol & Kotler 1999). The vertical network model encourages specialization and leads to companies focusing on their core competences (Achrol & Kotler 1999; Möller & Halinen 1999). These networks are mainly seeking to gain efficiencies in production and logistics, opportunities for faster business growth and access to new markets and market segments, and they are generally hierarchically oriented (Möller & Rajala 2007), i.e. there is usually one or a few larger actors who have more influence over the whole network. However, the network coordination is usually distributed to several actors, who possess the required knowledge to coordinate their specific segments of the value system (Möller & Rajala 2007). Möller et al. (2005) recognize the enhancement of the efficiency of the underlying value system as the
main goal for all vertical nets. Möller and Rajala (2007) also note, that in order to secure the efficiency of a vertical demand-supply net through the integration of production and logistics of the network actors, the net has to have efficient knowledge codification and information systems. Horizontal market nets are formed by direct or indirect competitors operating under similar conditions, that seek to combine their offerings and channel relationships to gain stronger market position, often on a global-level (Möller & Rajala 2007; Möller et al. 2005; Bengtsson & Kock 2000). By combining complementary products, services and business processes, the companies can create greater value for the customers (Möller & Rajala 2007) and achieve cost savings. These alliance networks between competitors often have a formal central committee with possible equity stakes (de Man 2004 via Möller & Rajala 2007), and the nets can be either enduring and tight, or loose and temporal, and they usually contain vertical relationships as well (Möller & Rajala 2007).

The second value system category, placed in the middle of the value system continuum, is called “business renewal nets”, and it includes nets that are also rather well determined and based on existing value creation systems, but which are also subject to modifications (Möller & Rajala 2007). These changes are carried out by network actors through gradual and local innovations, with the aim of enhancing the existing value net system (Möller & Rajala 2007). Overall, business renewal nets need to balance between exploring new knowledge and exploiting the already accumulated network knowledge (Möller & Rajala 2007). Networks with strong and highly interconnected ties and relationships facilitate exploitation of existing knowledge, while networks with loose connections favour knowledge exploration (Dyer & Nobeoka 2000). The diversity of specialized actors within a net creates opportunities for network learning, if properly coordinated (Kogut 2000; Dyer & Nobeoka 2000). Dyer and Nobeoka (2000) distinguish between network knowledge that can be codified and adopted into the practices of individual companies, and knowledge that remains on the network level. Especially the latter is likely to require very trustful and cooperating relationships between the network partners (Möller & Rajala 2007).

Möller and Rajala (2007) identify two main net categories belonging to this group: “business renewal nets” and “customer solution nets”. Business renewal nets are
focused on improving the efficiency of either existing vertical demand-supply nets or horizontal market nets, through enhancements in their offerings or in certain parts of their business processes (Möller & Rajala 2007). These nets are usually built around multi-company research and development projects with a distinct hub firm, or other multi-party projects aiming for business process improvements and that are temporal and goal-oriented in nature (Möller & Rajala 2007). According to Möller and Rajala (2007), customer solution nets are formed around project based businesses, where the different network actors have complementary set of competencies and resources, and the relationships within the net can be either vertical or horizontal. The network actors often come from various business and institutional environments, and they may have diverging roles in various different projects (Artto & Kujala 2008; Artto et al. 2008). Even though the projects are usually formed around a hub company and a number of quite stable core actors, the members for each project are selected from the lasting core network according to the nature and objectives of the project (Möller & Rajala 2007; Artto & Kujala 2008). Thus the networks involved in specific projects are temporal in essence, and their goal is to achieve “collective network capability” (Ruuska et al. 2009). Since the network members are to some extent familiar to each other and know something about the capabilities and resources of others, there is potential for efficiency gains over project networks that are formed from the scratch (Möller & Rajala 2007). Möller and Rajala (2007) name construction industry as one typical environment for this type of network, as large constructions processes that are put out to tender are usually executed by a customer solution nets that are led by a specific hub firm. This type of networks are therefore likely very common in the context of construction megaprojects such as Hanhikivi 1.

The third and final value system category is called “emerging business nets”. It concerns emerging value systems that propel the development and commercialization of new technologies, business concepts, value activities, and sometimes entire business fields (Möller & Rajala 2007; Möller et al. 2005). Even the largest corporations may not possess all the required resources to create new innovations and products based on them, as the fast paced technological development and the fragmented nature of required technological components have vastly increased the demand for knowledge and resources in R&D activities (Heikkinen, Mainela, Still & Tähtinen 2007). The domain is characterised by abrupt and radical system-wide
changes, paradigm shifts and intricate learning processes, and involves a lot of uncertainty and diverging expectations regarding the future, the partners and their capabilities, and the value activities (Möller & Rajala 2007; Möller et al. 2005). The knowledge and value creation activities within these networks are unspecified compared to the other categories, and thus the level of determination is lower. In the first phases the emerging business nets are mainly about creating common visions and making sense of the future opportunities, which can be a point of competition for companies driving diverging agendas (Möller & Rajala 2007). Once a network has some kind of an agenda, it can proceed to creating working applications (Möller & Rajala 2007). However, Möller (2010) notes, that sense-making can be a very difficult process due to the tacitness of new ideas. Möller et al. (2005) also point out the importance of evaluating the other actors due to the related uncertainty.

<table>
<thead>
<tr>
<th>Current Business nets</th>
<th>Characteristics</th>
<th>Structure</th>
<th>Value creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical demand supply nets</td>
<td>Stable value systems</td>
<td>Hierarchical</td>
<td>Maximizing vertical synergies</td>
</tr>
<tr>
<td>Horizontal market nets</td>
<td>Distinctive value activities</td>
<td>Spread coordination</td>
<td>Efficiency through specialization</td>
</tr>
<tr>
<td>Specified roles, resources and capabilities</td>
<td>Serial interdependency</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Business renewal nets</td>
<td>Rather well determined</td>
<td>Formal central committees</td>
<td>Combined offerings to create enhanced customer value</td>
</tr>
<tr>
<td>Business renewal nets</td>
<td>Gradual and local innovations</td>
<td>Loose or tight</td>
<td>Incremental value system improvements balanced with stability</td>
</tr>
<tr>
<td>Customer solution nets</td>
<td>Balance of knowledge exploration and exploitation</td>
<td>Include vertical relationships as well</td>
<td>-</td>
</tr>
<tr>
<td>Emerging business nets</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Application nets</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dominant design nets</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Innovation networks</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Figure 1. Strategic network types and features, adapted from Möller and Rajala (2007) and Hermes (2011).

There are three types of networks within this category. The first two network types in this category are called “application nets” “and dominant design nets”. These
networks are somewhat overlapping, but whereas application nets are usually led by a hub company connected to a net of complementary software, hardware and technology manufacturers trying to turn evolving technologies into business applications, the dominant design nets consist of both competitors and partly complementary firms sharing and driving the same or similar vision regarding technological standards within their business field (Möller & Rajala 2007). Therefore, application nets aim at beating the competition in commercializing new technological opportunities, while the dominant design nets want to turn their solutions into technological standards. As many companies are investing in technology development but lack the capability to commercialize the research outputs (Palo & Tähtinen 2011), application nets can be helpful in turning new technologies into offerings, e.g. through taking advantage of converging technologies (Nyström 2009). Möller and Rajala (2007) point out that as public opinion matters a lot in setting universal standards, the opinions and views of different stakeholders must be taken into consideration.

The final network type in this category is “innovations networks”. According to Möller and Rajala (2007), these are formed of scientific and or technology-based networks, such as universities, research institutions and research organizations that are connected by rather loose social and professional relationships. Even though these networks are mainly concerned with advancing technology and science in general and are not essentially business networks, corporations have also taken part in these nets e.g. through sponsoring and scientific participation (Möller & Rajala 2007). Companies are increasingly forming horizontal relationships to non-commercial actors in their efforts to develop new competencies and to gain access to new resources (Möller & Halinen 1999). Ojasalo (2004b) argues that even though achieving optimal potential of innovation networks requires minimal hierarchies, there has to be one actor who has some amount of power over the others, and who can thus coordinate the cooperation within the network. These networks are placed in the far right of the value system continuum, and thus have the least amount of determination.

Möller and Rajala (2007) also point out the existing gap between their strategic net classification framework and real-life strategic nets. The nets presented in their
framework are intended as general and ideal examples that can never exist in their pure form. Strategic nets are never fully determined or completely undetermined, as even the most stable nets are subject to local improvements on some level, and even the most radically emergent nets are always influenced by some existing vision or objectives of one or more of its members (Möller et al. 2005). Therefore, actual strategic nets are amalgamations of the presented ideal value-systems and may also include actors that are members in various different nets, or actors that have multiple roles within a single net (Möller & Rajala 2007; Möller et al. 2005). A company can have many different roles along the value-system continuum in multiple strategic nets, which may allow them to leverage their network presences and to form temporal nets, in order to pursue various different goals requiring knowledge and capabilities from multiple business nets (Möller & Rajala 2007; Möller et al. 2005). The strategic networks and their value systems are also in constant transition, as innovative and reforming networks may become current and stable nets as their value systems and activities become more specific and clearer (Möller & Rajala 2007). Networks are dynamic, as the actors, issues, needs, and resources often change in the long-run, which can also change the network relationships (Ojasalo 2004a). Network actors may also have diverging goals that they seek to pursue through the strategic net, which can complicate its mutual management (Möller et al. 2005). The discussed network categories and their features are presented in Figure 1.

3.2 Creation and development of strategic business networks

Business networks have often been seen to arise from interactions between organizations without any specific blueprint (Nyström 2009). According to some scholars, the interdependencies between network actors that limit their ability to control their mutual relationships and the net itself can be seen as evidence that networks cannot be intentional structures (Corsaro, Ramos, Henneberg & Naudé 2012). However, many others acknowledge that business networks can also be the outcome of strategic intent and vision (e.g. Partanen & Möller 2012; Möller & Rajala 2007; Heikkinen et al. 2007; Hinterhuber & Levin 1994; Snow, Miles & Coleman 1992; Jarillo 1988 etc.).
Networks are born from different kinds of relationships, as the resources and capabilities companies have, do not constitute exchange relationships on their own (Ritter 1999). Continuous interdependent relationships link the resources and activities of the network actors, and allow one party, to some degree, mobilize the resources of others (Håkansson & Snehota 1989). Also, the extent of existing network resources affects the formation of new ties (Gulati 2007). Ritter (1999) points out, that since most relationships a company has are interconnected, and since any single relationship can affect almost any other either positively or negatively, there is a need to consider the existing relationships and to make choices regarding the set of partners to cooperate with when developing the network further. If one actor is underperforming or failing in its activities, it may compromise the performance and competitiveness of the whole network (Partanen & Möller 2012).

Since the network relationships are interrelated and often interdependent, the portfolio of relationships is likely to be of even greater importance than individual ties (Ozcan & Eisenhardt 2009). According to this portfolio-view, companies should analyse and consider their presence in different nets aggregately (Möller & Svahn 2003). Constructing a successful business network requires creation of mutual trust, setting common goals and objectives, collaboration and co-operation, commitment, adaptation and active communication within the network (Nyström 2009).

Many authors recognize the importance of a hub firm to the creation and management of strategic business networks (e.g. Möller & Svahn 2003; Hinterhuber 2002; Jarillo 1988). Jarillo (1988) regards the existence of a controlling hub firm as necessary for strategic networks, and argues that it is the hub firm that initiates the strategic network and is active in maintaining it. Hinterhuber (2002) recognizes four different network value chain orchestrator roles: (1) architect that defines the vision and objectives and designates the network members, (2) judge that defines and monitors performance standards within the network, (3) developer that facilitates enhancement of physical and intellectual network assets, and (4) leader that drives voluntary participation and atmosphere of reciprocity, and rewards for performance. In many vertical networks, the hub company does little to no manufacturing of their own, but rather acts as an integrator that organizes and coordinates the value activities of other companies within the focal net (Achrol & Kotler 1999). However, Möller and Rajala (2007) point out that there have also been an increasing number of
networks that are not revolving around a single hub company. Snow et al. (1992) also emphasize the role of managers in the creation of business networks. They argue, that certain key managers act as brokers between organizations, marshalling and developing resources controlled by other firms. Similarly, according to Heikkinen et al. (2007), managers are creating access points and coordinating resources for the required activities through communicating within the nets.

Partanen and Möller (2012) suggest a stage-based hub firm driven framework for creating strategic business networks. Stage one involves the identification of the value creation activities required by the customer, which allows one to form a picture of customer needs and of the offering required to satisfy those needs. In the second stage, the value activities required to produce the offering, and the interdependencies between these activities are analysed, thus forming a picture of the overall business concept (i.e. the value system of the eventual network). In the third stage the firm sets objectives and decides which activities to perform internally, and which ones to delegate to partner companies. By keeping certain value activities in-house, the firm can secure its central position within the network. Once the company has decided upon which value activities to internalize and which to externalize, it should analyse the match between the requirements for performing the internal value activities, and the resources and capabilities it possesses. If there is a mismatch between the requirements of a specific value activity and firm capabilities and/or resources, the firm must either try to meet the requirements, or outsource the value activity to a network partner (according to the next described process). A parallel process must be conducted for each of the externalized value activities. The externalized activities must first be analysed, after which the most suitable partner candidates are identified. This is followed by negotiations that allow the firm to gain a more detailed view of the potential candidates. Once the best partners for each externalized value activity is found, these activities can be integrated into the overall value system, and thus the network is formed and the collaboration can begin. (Partanen & Möller 2012.)

Even though Partanen and Möller (2012) point out that the principles of this framework have been previously proven, they acknowledge that its contextual limitations (only tested once in the dynamic Finnish ICT sector) put the framework’s applicability into question. They suggest that the robustness of the model should be
tested in the context of different business concepts, economic conditions and cultures, which may influence and alter the network creation process.

Ojasalo (2004a) presents another kind of strategic network creation and management model. In this model, the first step includes identifying the key network. This is described as a two phase process, which begins by recognizing opportunities (i.e. potential value to be gained) that could be realized through networked cooperation. In addition to examining the needs of the customers, Ojasalo (2004a) suggest a broader perspective on identifying sources of value, and proposes the use of methods similar to generating new product development ideas. Once the network opportunities have been recognized, the result is a specific goal, around which the focal company organizes the key network. The goal may change as the network begins to take shape and as the network actors agree upon certain terms of cooperation. The second phase concerns the selection of key network actors. The focal company needs to consider which firms are included within the key network, i.e. through which firms the focal company interacts with the wider surrounding network. The selected actors should have complementary capabilities and skills that contribute towards achieving the goal of the key network and help in creating synergies between the actors. The focal company should also have influence and power over the most vital processes and capabilities (from the perspective of achieving the main goal of the network) of the key network members. Furthermore, the more compatible the interests of potential network members are with the underlying goal of the focal network, the better the network coordination is likely to be. As some network actors may be mutually exclusive, the trade-offs between different network constellation must also be considered. The second and third stages are concerned with developing a key network strategy to achieve the goals of the network, and the organization of operational level methods to manage the network. (Ojasalo 2004a.)
3.3 Managing strategic business networks

3.3.1 Levels of network management

As mentioned earlier, there has been a lot discussion on whether business networks are manageable, or beyond the control of the network actors. The views have been ranging from networks being an intentional organizational mode through which firms can enhance their competitive positioning (Jarillo 1988), to networks being self-organizing and emerging systems upon which individual organizations depend on, and are restricted by (Håkansson & Ford 2002; Möller & Rajala 2007; Ford & Mouzas 2008). Möller and Rajala (2007) argue that the main issue regarding networks is not whether they can be managed or not, but rather how different networks can be most efficiently managed, considering their varying requirements.

As networks can be perceived as borderless and ever extending, managers must focus on the most relevant parts of the network (Ojasalo 2004b). Möller and Halinen (1999) recognize four different layers in the management of business networks and relationships: industry level networks, focal nets and network positions, relationship portfolios and exchange relationships. The first level concerns the industry network in which the organization operates in. Instead of focusing on the industry wide network, the focal net and network position level concerns specific networks the organization operates in. These focal networks can be delimited from the industry network according to the firm’s network horizon, or by examining network groups of interrelated actors executing a mutual strategy. The management of relationship portfolios looks at how companies manage their exchange relationships, while the fourth and final layer, managing exchange relationship, focuses on the management of individual dyadic relationships. This study mainly focuses on the focal network level, though the management of relationships within networks is also discussed, as the two are highly interrelated. Questions concerning the second layer of network management examine the roles and positions of a firm in relation to other actors within the focal net, and the ways in which a firm can influence its own position and the whole focal net. (Möller & Halinen 1999.)
3.3.2 Managing exchange relationships

As business networks are composed of different kinds of exchange relationships between network actors, it is important to briefly address the management of individual relationships in a network context, even though the main attention is on the focal network level. Relationship research can be seen as a subset of network research (Ojasalo 2004a), and Easton (1992) regards relationships to be of key importance in understanding networks and their characteristics. Single relationships are also relevant when examining dynamics of change in business networks, as changes take place through interactions between the network actors (Halinen, Salmi & Havila 1999). Dyadic relationships influence networks and vice versa, and therefore companies cannot fully control or dictate individual relationships (Håkansson & Snehota 1995: 46). According to Ritter et al. (2004), if no interdependency exists between two actors on any level, there is no relationship to be managed. Therefore, business relationships are always highly determined by the nature of interdependencies that exist between the actors. These dependencies can be either positive or negative in nature, i.e. they either help or hinder the actions of a firm, and every relationship features both negative and positive dependencies in varying degrees (Ritter et al. 2004). Overall, relationships connect firms to their environment, as through them firms exert some degree of control over their partners, while at the same time relinquishing some amount of internal control (Anderson et al. 1994). Accordingly, both relationship and network management are essentially based on the paradox of influencing others while being influenced by them (Ritter et al. 2004; Gadde et al. 2003). Increased mutual benefits can be attained through the optimization of the combined resources, and through the coordination of dyadic relationships (Anderson et al. 1999).

According to Möller and Halinen (1999), relationship management includes the establishment, maintenance, development and termination of relationships. Furthermore, Håkansson and Snehota (1995) divide relationship and network management related issues into four different categories. From the relationship perspective, the first category concerns value activity linkages and how they are recognized, built, synchronized and maintained in the relationship. Resource ties form the second category, which is concerned with the optimal exploitation and joint
creation of resource ties, in order to make the most of the available resources. Management of actor bonds is the third category, and it includes trust-building, identity-creation and the management of the image conveyed by the firm’s actions. The final category deals with how to adapt to and facilitate change. All these questions are relevant in the network context as well.

Ojasalo (2004a) also recognized four primary strategies in the management of key network members. According to him, the relationships to other members can either be grown, developed, maintained or abandoned, based on the optimal extent of resource mobilization within the key network, and on the level of contribution the actor has in achieving the network’s goals. In order to execute these strategies and to manage the network, Ojasalo (2004a) suggests that operational level methods are needed. These concern improving the key network’s offering, i.e. actions to enhance value creation within the net, arranging appropriate organizational structures and optimal levels of network interaction, ensuring appropriate communication and information exchange within the network, developing required human resources and enhancing the related capabilities of individual employees. In addition, the specific network context imposes its own managerial requirements (Ojasalo 2004a).

3.3.3 Managing focal business networks

When moving from the management of relationships to managing focal networks, many of the themes and questions remain the same, though the extent to which an individual company can influence others can be further questioned on this level. According to Ritter et al. (2004), management in a network context can be perceived from two different angles. First, a company can be seen as a hub of the network that has control over the interorganizational network. Secondly, a company can also be seen as just another network member influencing and being influenced by the other members and the network itself. Companies are faced with different kinds of managerial situations as their roles, power and interdependencies vary in different relationships and networks (Ritter et al. 2004). According to Heikkinen et al. (2007), the point of network management is not to control others, but to manage the interactions one has with other network actors.
Anderson et al. (1994) point out, that in order for managers to understand the meaning networks have for their business, they must first have the capability to analyse the networks. Ford et al. (2003: 176) refer to these member held perceptions of the network as network pictures, and regard them representing the conceptions people have of the extent, characteristics and roles of the network. These perceptions are based on accumulated experiences, existing relationships and network positions, and are influenced by the issues, the level of knowledge, and the uncertainties related to these aspects (Ford et al. 2003: 176). A better understanding of the relationships constituting the network will enhance the firm’s capability to anticipate strategic changes initiated by others, and it is also vital in understanding the overall impacts of one’s own actions (Möller & Halinen 1999). Håkansson and Snehota (1995: 266) emphasize the need to monitor and interpret different kinds of actions and changes within the network. Ford and Mouzas (2008) also state that strategic thinking in networks must be based on analysis that takes into account both the company’s own view of the network, as well as the views of the other network actors, while at the same time considering the general perceptions regarding distinctiveness of network positions and of ideas related to developing or altering them. Gadde et al. (2003) share this notion and state that companies should avoid forming too self-centred perspectives regarding their network positions, since by neglecting the existing relationships and connections to other network actors, they may inadvertently narrow down their fields of vision, thus preventing them from recognizing opportunities for discovering and developing further resource dimensions. Ford and Mouzas (2008) also regard networks as having both facilitating and constrictive roles in the development of a company’s business strategy, since the strategies of individual network actors partly stem from the constant interaction with other network members, through which they evaluate the evolving network possibilities against the rigidness of the network. Ford et al. (2003: 178) point out, that in order to facilitate change within the network, one has to seek to alter the network pictures of other members as well. However, the network pictures cannot be abruptly or totally altered, and it takes a lot of time and systematic efforts to direct and change these perceptions (Ford et al. 2003: 178).

The capability to coordinate and mobilize the value activities of other network actors is at the heart of managing business nets (Möller et al. 2005). Coordination refers to
organizing the different relationships and activities within a network to increase its effectiveness (Lundgren 1992). According to Lundgren (1992), coordination involves mutual adaptation and learning that cause changes in the structure and in the distribution of power of the network in question. The interdependencies between network actors limit the opportunities for planning and controlling (Lundgren 1992; Håkansson & Ford 2002). Unlike coordination that seeks to orchestrate existing resource structures, mobilization concerns the creation of new resource structures and value activities through gaining access to, and by integrating, other actors’ resources and capabilities (Lundgren 1992; Möller et al. 2005).

Heikkinen et al. (2007: 910) define the management of networks as “the capability to influence the net”, and regard the management as actions being carried by actors in different network roles in order to influence the network or a network activity. However, Håkansson and Ford (2002) and Gadde et al. (2003) point out the network paradox of influencing others vs. being influenced by them. Within networks, relationships are instrumental in influencing others to achieve one’s own goals, but this instrument is reciprocal in nature. Different parties may all be trying to influence each other, while succeeding to varying extents. Furthermore, though increased control over the network might give a firm the ability to direct the network towards its own specific goals, too much control can extinguish the sources of innovativeness and efficiency (Håkansson & Ford 2002). Since companies operating in networks depend not only on the capabilities and resources of other network actors, but also on their initiative and drive for enhancements and change, assuming a dictating role within a network will suppress the external ideas and initiatives for further network improvement (Ford et al. 2003), thus preventing the network from reaching its optimal performance. According to Håkansson and Ford (2002), the actions of all network actors and the perceptions on which they are based, shape the dynamics of the network, through which the actors can develop their positions and gain positional advantages. However, these positional changes cannot be achieved alone, but require support or acceptance from at least some of the other actors (Håkansson & Snehota 1995: 266). Therefore, companies should encourage and help each other to convey their perceptions of the network and of their own positions (Håkansson & Ford 2002).
In a project based business network, there is a constant interaction between the permanent network and the temporal project specific network, as the permanent network influences the project participant choices, while the temporal network also has influence on the composition of the permanent network (Artto & Kujala 2008). Members of the permanent net may be partners in one project, while being competitors in the next (Artto et al. 2008), and the successes, failures and experiences of temporal project networks may alter the composition of the permanent network, e.g. by resulting in the withdrawal or removal of a permanent network member, or in adding of a new permanent member.

Ruuska et al. (2009) describe several network attributes that affect distances in network relationships in the context of large project implementation. The alignment of the actors’ goals, the level of determination in roles and responsibilities, the amount of trust between the actors, actors’ previous experience in joint projects, and unfounded actions or inactions all have an impact on the distance within the network. According to Ruuska et al. (2009), these factors can be managed through appropriate project practices (regarding e.g. communication, commitment, partner selection) that ensure the network attributes diminish distance instead of increasing it. Ruuska et al. (2011) identify several key elements in project governance. They regard contract arrangements, orchestration and implementation of procurement, management of supplier network, sharing and management of risks, monitoring and coordination, and communication and collaboration as the key questions related to large project management. While these issues are mainly related to the management of the overall project network, they also seem to be closely related to the management of focal networks operating in the wider project network.

As mentioned earlier, according to Möller and Rajala (2007) all business nets can be described by examining the underlying systems through which they create value. These value systems drive the development of differences in the actors’ capabilities and their capacities to learn within different types of nets, which in turn creates a need for differing management mechanisms (Möller & Rajala 2007; Möller et al. 2005). The three generic value creation domains and the seven network types described earlier therefore have differing management issues and call for diverging management styles and mechanisms. The management of strategic networks will be
further discussed in chapter five, though the attention will be only on network types relevant to the Hanhikivi 1 case. Möller et al. (2005) acknowledge that networks cannot be fully managed, and that they cannot all be managed to a same degree. They regard the manageability of networks as being relative to the network context.

3.4 Actors’ roles and positions within the network

Network positions and roles are closely linked to each other. According to Johanson and Mattson (1992), the network position of an actor is defined by the exchange relationships it has with other network members, while the network role refers to the actor’s part within the value system and to its relative importance compared to other actors. Due to the closeness of these descriptions, the two concepts are treated more or less as synonyms in the context of this thesis, and in further chapters they are generally jointly referred to as network roles. The network position of a firm is dependent on its field of business, its positions in other networks, and on its relative power compared to other network actors (Thorelli 1986), and the interpretations actors have of their own and others’ positions and roles affect how they act in the network (Anderson, Havila, Andersen & Halinen 1998). Furthermore, the network position of a firm is determined by the interactions it has had in the past (Ford et al. 2003: 178), and as pointed out by Heikkinen et al. (2007), the network positions are formed and changed as a result of the expectations actors have of each other, and of the intentional actions of individual actors. Therefore, a company can seek to influence its own position and those of others, but these efforts are also restricted by the role related perceptions of other network actors.

According to Anderson et al. (1998), networks are always changing, and the actors’ positions change as new relationships are formed and as existing relationships end, though the level and outcomes of these changes are dependent on the network context (Anderson et al. 1998; Johanson & Mattson 1992). Some networks are also more dynamic than others. In mature industries the relationships between network actors are usually more stable and the roles are also highly entrenched, which is the result of long-term interaction, cooperation and reconfiguration within the network to achieve optimal combinations (Low 1997). Strategic actions are used to preserve or alter a company’s position (Halinen & Törnroos 1998). A company can either seek to
stabilize its current position through enhancing its efficiency and effectiveness, or it can systematically try to alter its position either by developing new relationships, or by combining its existing relationships in new ways (Ford et al. 2003:181). The roles network actors have within the strategic networks identified during this research are further discussed in chapter five.

3.5 Network evolution framework

Thus far, the research has explored the concept of megaprojects and their peculiarities, provided a general overview of existing network literature, introduced a framework for classifying strategic network types, examined the creation and management of strategic business nets, and provided insight into the roles and positions of the network actors. Based on the presented network theories, a simplified framework for strategic network evolution is presented.

Network type, network roles and network management are interrelated factors in the development and evolution of a strategic business net. The relationship between these three concepts are clearly present in the conducted and presented literature review, and in this sub-chapter the relationship is further discussed, and a simplified framework of strategic net evolution based on this trinity is presented. Network type in this context refers to the seven network types presented in the Möller and Rajala (2007) strategic net classification framework, that were discussed in chapter 3.1. The network type deals with the value creation logic, structure and other characteristics of the network in question. Network roles were discussed in chapter 3.4, and they refer in this context to the nature of the real and perceived roles and positions the actors hold in the strategic network they operate in. The notion also includes the histories between the involved parties, and the perceptions the actors have of each other’s roles in the network, i.e. it also concerns both dyadic and network level relationships affecting the network roles. Network management was discussed in detail in chapter 3.3, and in this context it refers to the ways in which the network members seek and have the ability, both jointly and individually, to steer the network towards a certain direction through coordination, mobilization or by otherwise influencing the network and its members. The previously discussed key concepts of both network roles and management are included in the framework below their respective headings.
Not all networks develop in identical ways. As mentioned earlier, different types of networks require diverging management mechanisms and affect the roles network actors have, since if the underlying value system changes, so might the actors’ roles in it. A network based on knowledge exploration calls for a different kind of management and actor roles than a network striving for efficiency and knowledge exploitation. Certain kinds of networks are more stable than others, and changes are more likely to happen in networks closer to the right end of the value system continuum (Möller & Rajala 2007).

The network roles may also affect the management of a network, as well as the network type. The management of a network where the members have roughly equal standings will likely differ from a situation where there are one or a few actors who hold most power within the net. Also, the interdependencies between the actors affect the way planning and controlling can be carried out within a network (Lundgren 1992; Håkansson & Ford 2002), thus influencing the way the net can be managed. The roles affect the network type e.g. as the roles become more entrenched and as the value system becomes more determined, which may cause for example innovative networks to become more stable and rigid. The underlying value system may therefore undergo a profound change, and thus the network type may also shift towards the left end of the value system continuum.

The way a network is being managed can also have an influence on the network type and the roles within the network. As mentioned before, mutual adaption and learning can be achieved through coordinative actions, which can also cause changes in the structure and in the distribution of power within a network (Lundgren 1992), thus potentially affecting the network type and roles. If too much control is applied by a single actor in a network based on pursuit of innovation or efficiency, the value system of the net might be crippled and changed (Håkansson & Ford 2002; Möller & Rajala 2007), and the control can also suppress the other actors’ roles in the development of the network (Ford et al. 2003). Also, as pointed out by Heikkinen et al. (2007), when a network member manages to influence the network, the network itself will be altered to some degree.
Figure 2. Strategic network evolution framework, partly adapted from Möller and Rajala (2007).

The network type, network roles and network management influence and shape the formation and evolution process of a strategic network. These three factors are interrelated and to some degree inseparable. Therefore, all of the three factors will be regarded in the examination of the formation and evolution of the identified strategic nets potentially operating in the Hanhikivi 1 project. The presented framework of figure 2 is a strong simplification of reality and does not take account of external factors or network embeddedness (see e.g. Halinen & Törnroos 1998) affecting strategic network evolution, but it can be used to guide the examination of internally driven strategic network evolution. The formation of strategic networks in the context of the Hanhikivi 1 project will be later examined from the perspective of the discussed three factors, and related megaproject specific considerations will also be discussed. Thus figure 2 also serves as a simplified description of the paradigm acquired through the conducted literature review, upon which the examination of the strategic networks forming around Hanhikivi 1 is based on.
4 METHODOLOGY

4.1 Research methods

4.1.1 Methodological considerations

In order to examine the evolution of strategic business networks in the context of megaprojects, a qualitative single-case study research was conducted to explore the phenomenon. According to Welch, Piekkari, Plakoyiannaki and Paavilainen-Mäntymäki (2011), there are four methods of theorising from case studies: inductive theory-building, natural experiment, interpretive sense-making and contextualised explanation. These four methods differ in their relationships to contextualisation, i.e. how do they account for the research context, and causal explanation, i.e. how they perceive the nature of causality. Figure 3 illustrates the roles of contextualization and causal explanation in the four above-mentioned methods.

![Figure 3. Four methods of theorizing from case studies adapted from Welch et al. (2011).](image)

Welch et al. (2011) regard the traditionally perceived gap separating contextualizing and theorizing through causal explanation as a hindrance to the potential explanatory and contextualisation power of the case study research. While not entirely consistent or uniform with the description, the philosophical orientation of this research mostly resembles that of the contextualized explanation. The method is based on critical realism, that assumes there is an objective “real” world that is independent of our interpretations of it, but it also acknowledges that our understanding of the world is always subjective (Welch et al. 2011). In order to understand the inherent nature of studied objects, scientists conduct subjective research, and unlike the other three
methods, the contextualised explanation seeks to cross the gap between the context and causal explanation (Welch et al. 2011). Therefore, contextual explanation does not assume either the positivist approaches of inductive theory-building and natural experiment, or the pure interpretative approach of interpretative sense-making (Welch et al. 2011). Rather than aiming for generalizations based on causal linkages, or for pure contextual interpretations, the method seeks to integrate the context into the explanation (Welch et al. 2011). Contextual explanation approaches the making of generalizations with caution and moderation, as though causal factors may have inherent properties, these properties may vary under diverging circumstances (Welch et al. 2011). The approach of this research is both deductive, i.e. theory inspired, and inductive, i.e. data inspired. The conducted literature review and related theories were used to guide and shape the research, while at the same time the accumulating contextual understanding and observations had an influence on the course of the research as well.

Hanhikivi 1 nuclear power plant project serves as a case example of a megaproject, around which various strategic nets are formed. Empirical data was collected by interviewing actors involved in the project and in actual and potential strategic networks forming around Fennovoima’s plant project, which constitute the embedded units of analysis. A qualitative approach was chosen, as the research emphasis is on understanding and exploring the theme in question. Qualitative methods are well suited for situations in which a phenomenon is less well-known, when intricate details and comprehension is required, and also when an event cannot be accurately examined through quantitative means (Ghauri & Grønhaug 2005: 111). Qualitative data is rich and comprehensive by nature, and can provide precise ways to analysing organizational issues (Miles 1979). Qualitative methods allow one to delve deeper into the context and the underlying themes, reasoning and motivations, thus providing more intricate insight into the studied phenomenon itself (Ghauri & Grønhaug 2005: 112).

Easton (2010) regards case research as a method aiming for the creation of a holistic description through an iterative research process of examining a small number of social entities or situations. Furthermore, Yin (2009: 18) defines the concept of a case study as “an empirical inquiry that investigates a contemporary phenomenon in
depth and within its real-life context”, and regards it as being especially suited for cases where the borders of the phenomenon and the context are hard to distinguish. According to Ghauri and Grønhaug (2005: 115), the suitability of a case study is dependent on the research objective, problem and questions, on the selected temporal context, on the amount of control the researcher has on the examined events, and on the nature of information and on the methods required to collect it. Case studies are suited to answer questions ‘how’ or ‘why’ (Easton 2010; Ghauri & Grønhaug 2005: 115), and they allow the researcher to make sense of a complex set of diverging factors but are limited, however, by a small sampling population (Easton 2010). A single-case study was selected also due to the rarity of the project and the complexity of the studied phenomenon, and to keep the study manageable at the given time frame. A single-case study is also suitable to study a commonplace or a “typical “project” among many different projects” (Yin 2009: 48), and though the Hanhikivi 1 project is not exactly commonplace, and though one can see it as an “extreme case” (see Yin 2009: 47) of a Finnish construction project, it is a quite typical representation of a megaproject on an international scale. Case studies often rely on multiple sources of data, the collection and analysis of which is aided by previously devised theories and gathered information (Yin 2009: 18).

In this research, the main goal is not to test the described theories, but rather to examine the phenomenon of the formation of strategic nets in the selected context, in which the existing theories have an enabling and supportive role. This was carried out by conducting a set of interviews with representatives of various different organizations with potential involvement in, or information of, the formation of strategic networks forming around the Hanhikivi 1 project.

Interviews were selected as the primary data collection method, as they leave more room to manoeuvre and to make reactive focusable questions, they produce descriptive examples, and they are also helpful in identifying connections between different phenomena, especially when there is little objective data from the subject area (Hirsjärvi & Hurme 2011: 36). Also, since in-depth interviews do not limit the respondent’s answers to only a few alternatives, a clearer and more accurate picture of the respondent’s position and behaviour can be formed (Ghauri & Grønhaug 2005: 133). Moreover, interviews usually have a better participation rate compared to
questionnaires for example (Hirsjärvi & Hurme 2011: 36), which was an important aspect given the rather strict research deadline. Even though the perceptions and backgrounds of the interviewer and interviewee can hinder the communication through misunderstandings and misinterpretations, a carefully planned interview can provide a very rich set of data (Qu & Dumay 2011). Therefore, anticipating and reacting to potential mismatch in terminology, meanings and interpretations can be very important in collecting accurate data.

4.1.2 Focused interview as a data collection method

To carry out the interviews a focused interview method was chosen. It is a semi-structured interviewing method, in which the general topic, themes and sub-themes are the same for each interviewee (Hirsjärvi & Hurme 2011: 48). The focused interview method brings the perceptions and interpretations of the interviewee to the foreground (Hirsjärvi & Hurme 2011: 48), which can be helpful in gathering data concerning the perceptions firms have of the surrounding networks, of their own network roles and those of others, and of the potential network management mechanisms. As the perspective from which a particular focal network is examined has a great influence on the way in which the network is seen (Ford et al. 2003), it is important to find out and examine the varying perceptions different network actors might have.

Even though the interviewer must make sure each theme category is brought up and discussed in the interviews, the extent and the order in which the themes are discussed can vary from one interview to another (Eskola & Vastamäki 2007: 27). The questions themselves can vary and they are not strictly ordered, though the order cannot be totally random, as this is limited by the selected theme categories (Hirsjärvi & Hurme 2011: 48). In a focused interview, the goal is to have an interactive interviewer-led conversation that is loosely guided by the interviewer’s theme framework. Given its conversational nature, a semi-structured interview allows the interviewer to reactively respond to the interview setting and interviewee output by arranging the questions and setting the style and pace, in order to gain the fullest answers from the interviewee (Qu & Dumay 2011).
The framework consist of the selected broad theme categories, of questions that allow one to focus on certain parts of a theme, and of more specific question aimed to identifying the minor details within a theme and that are only deployed if the more broader questions have failed to generate an answer (Eskola & Vastamäki 2007: 37). In this study, the theme categories were selected mainly by deriving them from the conducted literature review and related theories. In such an approach, the research problem links the themes together and sets boundaries for their selection (Eskola & Vastamäki 2007: 34). Despite deriving primarily from the presented theories, the theme categories were also influenced by the research context. The primary theme categories are: the project, partners, and network roles, management and continuity.

4.1.3 Interviewee selection

Since it was hard to determine which local companies could potentially take part in the project, and furthermore, which of those companies could provide relevant information concerning the studied phenomenon, it was also very difficult to define a target population at the given point of time. Therefore, the selection of the companies to be interviewed was done via snowball sampling. The primary source of potential interviewees were two municipal business development organizations that had been involved in preparing and communicating with local companies interested in the Hanhikivi 1 project and related networking, and who also possessed a great deal of information regarding the project and concerning the networks that were under consideration or even taking shape between local companies. These two organizations were the first ones to be interviewed, and the rest of the interviewees were selected by considering the combined lists of suggested potential interviewees, and by previewing their suitability in the light of the studied phenomenon. The two organizations were also helpful in gaining contact with the interviewed companies. Fennovoima was an obvious and important interviewee, and a meeting with their representative was arranged among the first. Most of the interviewees were Managing Directors or other high level managers.

The relatively low number of participating interviewees is justified, as the main emphasis is on generating in-depth, meaningful data. Qualitative methods are generally linked with a limited number of samples, and they often examine the
phenomenon in question from various perspectives and angles (Ghauri & Grønhaug 2005: 112). The interviewees represent organizations that come from different industries, are of different sizes, and who possess varying roles at varying project tiers. The interviewees include representatives (one from each) from: (1) the project owner, (2,3) two municipal business development organizations, (4,5) two engineering workshops, (6,7) two construction organizations of which one operates mainly in infrastructure constructions and the other in industrial construction, (8) a service company specialized in pipeline and machinery insulation and maintenance, (9) a construction surveying service company, (10) a company specializing in the planning and manufacturing of maintenance platforms and walkways, and (11) an international consulting company.

4.1.4 Conducting the interviews

The eleven face-to-face interviews were carried out in May 2013. Excluding two interviewees, all interviewed company representatives received the questions prior to the interviews, and all interviewees received the necessary and relevant information regarding the research and the interviews beforehand. All except one interview were voice recorded and later on transcribed, and additional notes were also taken. All the interviews were conducted within 24 days, and the average length of the interviews was approximately 70 minutes, with the longest being 97 minutes, and the shortest 21 minutes. Even though the themes remained the same for every interview, the more detailed questions were subject to minor changes, as the first two interviews pointed out some room for improvement. The interviews were conducted in Finnish, and therefore all of the latterly presented quotations are careful translations of the original interview transcriptions. All interviews are listed in table 1.

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Type of organization</th>
<th>Title/Position</th>
<th>Length</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Nuclear power company/ Project owner</td>
<td>Development Director</td>
<td>1h 22min</td>
<td>21.5.2013</td>
</tr>
<tr>
<td>2.</td>
<td>Municipal organization</td>
<td>Project manager</td>
<td>1h 38min</td>
<td>6.5.2013</td>
</tr>
</tbody>
</table>

Table 1. Conducted interviews.
4.2 Data analysis method

According to Wilson (2010: 255–262), there are four steps in the process of analysing qualitative data. First the collected data must be transcribed. Once the interviews have been written up, the text must be read through and coded. The coding involves generating categories, themes and patterns (Wilson 2010: 255), through which the gathered data can be organized, separated and compiled, and in the context of qualitative analysis it also the beginning to achieving understanding and creating theory (Ghauri & Grønhaug 2005: 208). The coding process can be either inductive, i.e. emergent coding where the categories are formed by examining the data, or deductive, i.e. priori coding where the categories have been determined before the actual data analysis phase (Wilson 2010: 258). Data collected by the means of focused interviews are commonly analysed through structuring and reducing the data into specific themes, or by constructing descriptions based on the types of data (Eskola & Vastamäki 2007: 42). In this research, the primary theme categories used in the interviews also serve as the main basis for coding the gathered data, and given the amount of raw data, they are sufficient for organizing and handling the information. However, the contents of the gathered data also had an
impact on the data codification, and thus the used data coding approach can be described as a mixture of inductive and deductive approaches. In addition to coding the data, data reduction was also carried out by carefully excluding irrelevant and insignificant information.

The third step is to interpret the findings. All information concerning each selected theme was analysed on a theme by theme basis. As the themes were mainly derived from the presented theoretical content, the analysis also partly depended on the theoretical propositions (e.g. Yin 2009: 130), which are also present in most of the sub-questions. Overall, the theoretical content of the reviewed academic literature has been influential in planning and structuring of this thesis, while at the same time, the collected data has had some influence as well, especially regarding the factors affecting the formation of strategic nets. In this case the propositions concern the theories related to the sub-questions’ themes, and they help in focusing one’s attention on certain data (see Yin 2009: 130). Information from each interview falling under a single theme category was first examined in the light of the presented sub-questions. First, third and fourth sub-questions were approached from a general perspective, and the data concerning each respective theme was analysed by comparing between data collected from each embedded unit of analysis, and by reviewing it from the perspective of the presented theoretical and contextual content.

With the second sub-question, that examines the strategic network types around the case project, the comparisons were primarily made by comparing data of each embedded unit of analysis to the presented theoretical framework from Möller and Rajala (2007). The fourth step in the process of data analysis concerns the writing of the report.

In this research, the non-verbal communication present in the interviews was not recorded, and was thus primarily excluded from the analysis. However, it may still have indirectly affected the data analysis, as the observed non-verbal communication can have an effect on how a researcher perceives the answers and the meaning behind them (Hirsjärvi & Hurme 2011: 34).
5 HANHIKIVI 1 AND THE FORMATION OF STRATEGIC NETS

This chapter presents the findings related to the four presented sub-questions, while also providing more information concerning the project in question. First the nature of the project and the project network are discussed, and a table illustrating the project history is presented. Then the factors affecting the formation of strategic networks around Hanhikivi 1 (and potentially other construction megaprojects) are presented, which is followed by an introduction of the identified strategic networks. Then the roles within the identified networks are discussed, while also noting the roles of actors outside the networks that may have significant influence on the networks in question. This is followed by the findings related to the management of the networks, and finally the formation and evolution of the identified networks are examined and discussed.

5.1 Project Hanhikivi 1

5.1.1 Hanhikivi 1 as a megaproject

The Hanhikivi 1 project was officially started in 2007 when Fennovoima, owned by Voimaosake SF (66%) and E.ON Nordic AB (34%), was founded. A plan to build a new nuclear power plant in Finland was announced, and the plant was targeted to be up and running by 2016-2018. But as often is in the case of megaprojects, the original project schedule proved to be overly optimistic, and by August 2013 the project is still on a preparatory phase. The project has suffered some setbacks, such as the withdrawal of the energy company E.ON from Fennovoima, leaving a wide gap in the financing of the project. However, the confidence of those involved are still rather high regarding the realization of the nuclear power plant, and the project is gradually proceeding and the process of selecting a plant supplier is on-going. Fennovoima has been officially negotiating with three potential plant suppliers, that include AREVA, Toshiba and Rosatom, of which AREVA and Toshiba are no longer (at the moment at least) involved in the bidding process. The negotiations continue only with Rosatom on a 1200 MW pressurized water reactor. Plant suppliers can also be involved in the financing of a plant, and Fennovoima and Rosatom have been negotiating on potential joint ownership in this context as well.
In 2010 the Finnish parliament gave a positive Decision-in-Principle concerning the construction of a new nuclear power plant in Finland. In the following year, the municipality of Pyhäjoki was selected as the plant location after four years of evaluation of, and negotiations with, various potential sites. The next big step in Fennovoima’s project is the selection of the plant supplier, after which the two parties will have to file for a nuclear power plant construction permit by the year 2015, after which a new Decision-in-Principle would be required. As the plant type Rosatom is offering was not included in the original Decision-in-Principle, a new application might be required nonetheless. So far Fennovoima’s activities in the construction site have been limited to a series of geological and biological test, and no concrete clearance or construction efforts have yet been made. Before the construction of the plant can begin, the clearance of the site and the construction of necessary infrastructure and roads must be carried out. Table 2 features background information on the Hanhikivi 1 project in the form of major events and announcements. It gives a glimpse on the intricate and time-consuming nature of the related negotiations and political process, and also provides a short project history. The project has been in process for many years, and yet no concrete action has been taken at the construction site itself, aside from the biological and geological surveys. The data for the table was gathered from Finnish news and newspaper articles from Kauppalehti, Kaleva, Taloussanomat, Yle uutiset and Helsingin Sanomat.

Table 2. Project Hanhikivi 1 background and major events.

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 2007</td>
<td>German electricity company E.ON seeks to become a major player in the Finnish electricity production business. It is planning to build a Nuclear Power plant in the town of Loviisa. E.ON is also looking for Finnish partners to form a strong grouping around the project.</td>
</tr>
<tr>
<td>May 2007</td>
<td>E.ON doesn’t receive the necessary permits from the town of Loviisa. Unclear whether E.ON seeks for another plant location or decides to abandon the project.</td>
</tr>
<tr>
<td>June 2007</td>
<td>Fennovoima is founded. Main participants include Outokumpu, Boliden, Rauman Energia, Katternö ja E. ON. The aim of Fennovoima is to build a nuclear power plant to ensure electricity supply for its owners, and the plant is expected to be operational by 2016-2018. Negotiations with the towns of Himinka, Kemi, Keminjärvi, Ii, Pyhäjoki, Rahe, Simo, Vaala and Kristinankaupunki concerning the plant location have already started.</td>
</tr>
<tr>
<td>Date</td>
<td>Event Description</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>September 2007</td>
<td>Fennovoima is about to select the nuclear reactor suppliers for suitability checks.</td>
</tr>
<tr>
<td>May 2008</td>
<td>Fennovoima is choosing between two plant suppliers, Areva and Toshiba.</td>
</tr>
<tr>
<td>January 2009</td>
<td>Fennovoima starts the necessary political process for obtaining a Decision-in-Principle.</td>
</tr>
<tr>
<td>December 2009</td>
<td>Fennovoima narrows down the list of potential plant sites to Pyhäjoki and Simo.</td>
</tr>
<tr>
<td>April 2010</td>
<td>Finnish government has decided to grant two new nuclear power plant permits to TVO and Fennovoima</td>
</tr>
<tr>
<td>May 2010</td>
<td>The Finnish government accepts the permits.</td>
</tr>
<tr>
<td>July 2010</td>
<td>The Finnish parliament has accepted the permit. Fennovoima gets the Decision-in-Principle.</td>
</tr>
<tr>
<td>December 2010</td>
<td>New members join Fennovoima, including Talvivaara Mining Company.</td>
</tr>
<tr>
<td>July 2011</td>
<td>Fennovoima sends calls for tenders to Toshiba and Areva.</td>
</tr>
<tr>
<td>October 2011</td>
<td>Fennovoima has chosen Pyhäjoki as the location for the plant.</td>
</tr>
<tr>
<td>January 2012</td>
<td>Fennovoima receives tenders from Toshiba and Areva.</td>
</tr>
<tr>
<td>August 2012</td>
<td>S-group withdraws from Fennovoima. Some members, e.g. Atria, have withdrawn earlier.</td>
</tr>
<tr>
<td>October 2012</td>
<td>Founding CEO of Fennovoima is fired. E.ON, which owns 34% of Fennovoima, withdraws from the company, leaving a significant gap on the project funding.</td>
</tr>
<tr>
<td>January 2013</td>
<td>The final repository for Fennovoima’s nuclear waste is still unclear.</td>
</tr>
<tr>
<td>February 2013</td>
<td>E.ON sells its ownership of Fennovoima to Voimaosakeyhtio SF. Negotiations between Fennovoima and Areva have ceased. Fennovoima and Toshiba begin negotiations for a 1600MW boiling water reactor.</td>
</tr>
<tr>
<td>April 2013</td>
<td>Fennovoima begins negotiations with reactor supplier Rosatom.</td>
</tr>
<tr>
<td>June 2013</td>
<td>Fennovoima is negotiating with Rosatom on joint ownership of the plant.</td>
</tr>
<tr>
<td>July 2013</td>
<td>According to Finland’s minister of economic affairs, the selection of Rosatom may require a new Decision-in-Principle. Fennovoima continues negotiations only with Rosatom. In an interview carried out by Taloustutkimus, majority of Finns disapprove on Rosatom becoming a part owner of the plant.</td>
</tr>
</tbody>
</table>
If constructed, Hanhikivi 1 would be either sixth or seventh nuclear power plant in Finland, depending on the schedule of the Olkiluoto 4 plant project. The project itself is very complex in nature. Started 5 years ago, the multi-billion euro project is still on its preparatory face, and further efforts are required before the construction can begin. The construction itself will take years to carry out, and further delays can be expected to be more than likely, as is typical in projects of this nature (van Marrewijk et al. 2008). This kind of a construction undertaking is among the most complex and grandest individual construction projects in Finland within the last few decades, and it certainly fits the provided description of a megaproject. The construction project consists of multiple levels, and it can be separated into areas within and without the actual plant zone. In addition to pure construction and assembly, project management, design and planning, maintenance services etc. will also be required. Within the plant’s fences the requirements steepen while moving towards the reactor core. All parts delivered to the plant and all work conducted there must be thoroughly documented according to strict standards, which can be a daunting requirement for many smaller and inexperienced potential actors. The main buildings in the plant site are the reactor and the turbine buildings, but the facility also requires numerous other buildings, and supporting and surrounding infrastructure to be constructed. In addition to the on-site facility constructs, supporting infrastructure and temporary lodgings for the construction workers must be erected, while also providing the workers with all essential services.

5.1.2 Levels within the project network

All in all, the undertaking will require a huge project network encompassing numerous operators and companies from multiple industries with various skills, resources and capabilities. Also, the government officials are closely involved throughout the project, as the Finnish governmental authority for the nuclear industry, STUK, oversees and regulates the radiation and nuclear safety aspects of the project. The three main parties include the project owner (Fennovoima), the selected plant supplier and STUK. In addition to these three, Fennovoima might opt to choose a constructor who would take the overall responsibility for constructing all the additional constructs not provided by the plant supplier’s project organization, and it could also be seen as being at the top of the project network. Moreover, as
Toshiba, for example, is not a construction company, they would have had to bring a constructor with them if they had been selected as the plant supplier. This constructor would also have had a central role at the top of the project network.

The plant supplier and its main contractor will divide their respective construction tasks into smaller parts, and separate chains of international and domestic contractors, subcontractors and suppliers are formed under each part. Within these chains there are actors operating in many different levels, and the overall supply network can be expected to be very complex and extensive. Actors may be involved in multiple parts of the whole project, and have different roles within them.

The construction method, building schedule, and the overall project network are dependent on the selection of the plant supplier. Each plant supplier has its own project organisation, its own way of approaching the project, and each has its own project operation culture. Achieving coordination, mutual understanding, and assuring compatible interpretations at the top of the project network between Fennovoima, STUK and the selected plant supplier is of key importance to the success and fluency of the project. As pointed out by Hellström et al. (2013), the way the relationships are formed, and the decisions that are made on the early stages of a large project, create the foundations and tone for the long-term governance of the project. Therefore, it is highly important that these actors have a mutual understanding regarding the regulations, contracts and requirements related to the project, in order to avoid expensive and delay-causing misconceptions later on. The overall project network may also vary considerably depending on the selected supplier. However, the regulations and directives of STUK will set certain limitations regarding the way the project is carried out. The interviewees had varying opinions regarding the selection of the plant supplier and on who the optimal supplier would have been. Many of the interviewees also had previous contacts with some of the plant suppliers, which of course influenced their opinions on supplier selection.

5.1.3 After the construction

After the construction is completed, the plant will require regular maintenance over its roughly 60 year lifespan. The plant will be mainly operated by Fennovoima’s
approximately 450 employees, but the maintenance work will most likely be conducted by capable local actors, and likely by those who were involved in the construction process. Furthermore, additional buildings and infrastructure may also need to be built, and the possibility of the construction of an additional reactor sometime in the relatively near future cannot be entirely disregarded.

5.2 Hanhikivi 1 and the strategic nets

5.2.1 Factors affecting the formation of strategic nets

Through the conducted interviews many factors with potential impact on the formation of strategic networks among potential contractors were recognized. First of all, many of the interviewed organizations had done little preparing concerning Hanhikivi 1, as the project is still in such an early phase. Most of them were waiting for Fennovoima to select the plant supplier before making any further actions or commitments. The plant supplier does indeed play a key role in the formation of strategic networks around the project, while also having a potential impact on the nature, structure, and relevancy of the said networks. Each plant supplier will have their existing network of partners, suppliers, consults etc. that they have operated with in the past. However, this does not mean that the whole network would be transferred into this project, and the supplier’s network might already be involved in various other projects that consume most of the available resources within it. Still, there might be little incentive to disregard existing, working and mutually beneficial relationships, if the pricing is competitive. Therefore, it might be harder for local actors to gain access to the project network, if the plant supplier’s network is very extensive and rigid. The plant supplier (or its primary contractor) is still likely to select the subcontractors through competitive bidding.

Also, the way in which the plant supplier will carry out the construction will have a significant impact on the formation and viability of strategic nets forming under the top level of the project network. When comparing Toshiba and AREVA, for example, one can easily recognize the differences in the way these two suppliers are used to carrying out similar projects. Toshiba represents a modular building style, in which the whole construct is made and delivered in large modules that are likely
built outside the construction site and quite possibly abroad. Unlike Toshiba, AREVA favours on-the-site building with likely longer construction time, and the construction style and project organization of Rosatom is unknown for the moment.

*It (the inclusion of a primary infrastructure constructor) still remains somewhat undecided, as the final project form and the selected plant supplier may influence and determine the execution method and the contracting structure of even some of the specific infrastructure tasks* (Int. 1.)

Networking among different level actors will partly depend on how the construction will be carried out, on how small pieces each part of the construct will be split into, and on how large ensembles will have to be constructed and supplied on their respective project levels. If a larger ensemble is required, smaller actors have a higher incentive to join their resources and know-how together, in order to be able to take responsibility for larger parts of the project, and thus gaining access to higher tier bids. If a potential actor can only deliver very small ensembles, it will seem less interesting and less preferable to the plant supplier or the higher level contractors.

*It (the potential nature of network collaboration) depends largely on the plant supplier and on the types of structures and compositions required.* (Int. 7.)

Furthermore, the risks are considerably higher if you take charge of a certain part of the project, compared to just doing some subcontracting, as one has to bear the responsibilities towards the owner for related documentation and quality. In such a case the financial risks can also be extensively higher, especially since a company might have to pay its subcontractors even if the company itself is still waiting for its payment. The construction schedule may also influence the formation of nets, as it can affect the amount of time certain resources will have to be reserved for that specific project, thus preventing their utilization in other potential undertakings.

The industry in which the actor operates in and the level of its specialization seem to have a clear influence on the company’s willingness and need to enter into strategic
networks in the context of the project. The interviewed companies with higher level of specialization saw networking as less important in the context of Hanhikivi 1 than those who offer more common services and products, such as basic construction work. Among the smaller companies, those who offer more specialized services have a higher likelihood of receiving direct orders from the plant supplier or its primary contractor. Therefore, if the potential project related activities of a company are less dependent on the construction style and on the selection of the plant supplier, i.e. the related work and its amount would be very similar regardless of the construction style, then the company might feel less pressure to make elaborate preparations to meet the project demands. The size of the company also comes into play, as relatively small companies with common products and services might have no option but to join their forces together, if they want to challenge the bigger competitors in the bidding phase. The plant suppliers Fennovoima has been in contact with have all indicated that the bigger the offered ensemble and the lower the amount of required contact interfaces, the more interesting an offer will be.

All of the available plant suppliers ... have told and indicated right from the beginning that the bigger the delivered ensemble is, and the less contact interfaces there are, the more tempting an offer is. (Int. 1.)

The project owner can also influence the composition of parties involved in the project through including certain standards in the contract that must be fulfilled, and by providing suggestions or tip-offs concerning potential subcontractors e.g. for the plant supplier. This could be especially relevant in the context of highly specialized companies that meet some specific standards and possess skills that their competitors lack. One of the interviewed companies did a small project for TVO (the owner of the Olkiluoto 3 project) who then recommended the company to AREVA (the plant supplier in Olkiluoto 3), and the company did sign a contract with them. Also, the contractual rules concerning the concatenations of contracts to different level subcontractors might impose certain structural limitations for the forming networks.

The potential synergies of combining resources, services and know-how must be thoroughly evaluated before entering strategic networks. Each actor must add some specific value to the network and its offering, as it is pointless to include a partner
who doesn’t add any value to the network, or who doesn’t have the resources or capabilities to carry out its respective tasks. The interviews also brought up the existence of a leading hub company and the elaboration of a transparent and fair network revenue logic as two of the main prerequisites to forming a strategic network in the context of such project. Potential partners must also have sincere willingness to participate in the project, and the preparedness to invest in it. Moreover, many of the interviewed organizations recognized the temporal uncertainty related to payments as one of the major risks in the project. Given a situation in which the project is suffering from delays and setbacks, the payments may also be delayed. As an example, a few of the interviewed organizations that had been involved in the Olkiluoto 3 project had received payments from the plant supplier late, while they themselves had to pay their subcontractors and suppliers in time. Therefore, a company has to have a solid financial situation when entering such a project, in order to maintain its solvency. In a situation where an actor is not doing so well monetarily, alleviation to its financial deficiencies as well as risk sharing might be achieved through the formation of strategic nets.

As mentioned before, individual exchange relationships play an important role in networks (e.g. Ojasalo 2004a; Halinen et al. 1999; Easton 1992). The shared history between potential partners may be instrumental in either enabling, or preventing the formation of a strategic net. If the actors have had poor experiences of working together in the past, they might see mutual collaboration as unfavourable, and in one of the strategic nets forming around the Hanhikivi 1 project, some actors had indeed been left out due to negative shared histories.

One of the biggest challenges (in Hanhikivi 1 related networking) is to suddenly team up with the fiercest competitor. (Int. 2.)

All in all, most of the interviewees saw that they would not take unfamiliar actors into the network during a project of this nature, and nearly all regarded previously familiar and well-tried partners as the only potential candidates for their potential networks. Most interviewees saw familiarity as a prerequisite for trust and open communication, which are vital for the proper functioning of a network (e.g. Nyström 2009; Marrewijk et al. 2008), especially at this early stage when the
networks are merely taking shape, and when there is still so much uncertainty and lack of information concerning the project itself. Furthermore, personal experiences and relationships of the top executives also have a deep impact on strategic networking activities, and personal chemistries were seen as highly important in the formation and success of strategic networks. The network might fall apart due to personal disputes between members of different network organizations, and executives might be unwilling to work together with people whom they have had troublesome relationships with.

*It may well be that some companies can never form mutual networks, and such plans may fail, for example, due to personal chemistries.* (Int. 3.)

Furthermore, some of the interviewed executives had somewhat negative opinions regarding the concept of strategic business networks, and some also had negative past experiences of such undertakings. If the people holding influential positions within an organization view strategic networks and networking negatively, they might present an obstacle for the formation of a potential network (regardless of the potential outcomes).

The presented factors can be divided into three main categories that comprise of the factors arising from the primary project network, the potential strategic network member organization, and from the potential strategic network and its member constellation. These factors can either facilitate the formation of certain kinds of strategic networks around this type of construction megaprojects, or create obstacles for them. The impact of each factor has been discussed above to some extent, but all in all they are more or less presented “as is”, without further examining the (potentially intricate) relationships between them or their relative importance in the formation of networks. In order to achieve such understanding, further research into the matter is required. The identified factors affecting strategic network formation in the context of Hanhikivi 1 are presented in figure 4.
Figure 4. Factors affecting the formation of strategic nets in the context of Hanhikivi 1.

5.2.2 The formation and types of strategic nets around Hanhikivi 1

The potential and realized strategic networks, i.e. the planned and operating networks, identified during the interviews, represent the first two categories of the Möller and Rajala (2007) value system continuum. All of the newly formed networks are still in their infancy, and most of the interviewees were still waiting for the selection of the plant supplier before making any further commitments or initiatives. Most of the identified networks were not built from the scratch, but have rather either existed in some form before the announcement of the Hanhikivi 1 project, or have evolved from existing network relationships, e.g. through a change of focus and/or by adding new network members. Many of the interviewees, some more actively than others, have also participated in preparatory info meetings and project related
get-togethers arranged by Fennovoima, municipal organizations, local chambers of commerce etc., and some have also had preliminary talks with potential project and/or network partners. Given the early phase of the project and the lack of a selected plant supplier, the concrete steps taken by potential project actors have been rather small. In order to make more clear distinctions between the presented networks in the following chapters, each network will receive a more-or-less descriptive name for purely recognition purposes.

(1) The first potential strategic business network observed during the interviews is a planned project-based horizontal network formed by local Finnish companies operating in infrastructure construction industry. The network is concerned with finding a working revenue logic solution on how the participating companies could form a horizontal customer solution net, and thus enhance the likelihood of getting into the Hanhikivi 1 and other larger projects in the area. The network consists of around dozen different sized companies mostly operating in the same field of business, and that share a history of mutual competition and project-based collaboration. The companies are also connected by an expert association called INFRA Ry, that consists of 1600 member companies operating in the infrastructure industry, and that’s purpose is to enhance the overall productivity of its member organisations. This association has been a unifying factor between the network members for decades, and it also served as a medium for finding suitable partners to form the network for Hanhikivi 1 with. The network is hub company driven (by the company represented by the interviewee), but the managerial authority is divided in relation to each member’s contribution within the network. The interviewee regarded the network as being still somewhat loose, but predicted that it will become much tighter in nature as the project progresses, and as the network becomes more mature. There have been talks between the network members concerning the possibility of forming of a new joint company and bringing in management from without the network. One of the other interviewed companies providing construction related measurement, survey and laser scanning services has been tentatively in contact with the network and is considering joining it as well, but they are still waiting for the project to switch on to the high gear before taking any further steps.
The main purpose of the network is to keep the risks manageable through sharing them within the network, and also to be able to respond to the strong competition in the context of Hanhikivi 1 and other large projects within their field of business. On their own, these companies would be hard pressed to match the offers made by larger competitors, and together they can take on larger contracts with less individual risk.

*It (Hanhikivi 1 related networking) is a must. Of utmost importance. It is a question of risk management and of even getting into the project.*

(Int. 6.)

The interviewed company sees the participation in such a project as an opportunity for accelerated growth, both domestically and internationally, and sees the network as vital for getting into the project. Furthermore, the network is supposed to operate in other similar projects with project specific member compositions, i.e. not every organization involved in the Hanhikivi 1 project will necessarily be transferred to every new project. Given the uncertainty regarding the schedule of Hanhikivi 1, the network might be involved in other projects before the nuclear plant construction begins. The network might also transform from a customer solution net into a horizontal market network as the value activities, actors and business processes become more well-known, i.e. as the determination within the net increases, and if the constellation of members involved in projects becomes more constant. This network will be later on referred to as Infrastructure network.

(2) Another distinct strategic network that was identified is formed by several companies operating in different complementary business fields. Most of the companies have been involved in various co-projects in different parts of the world, and they know each other well. In addition to the old members, a few new members have joined the net as well since the network started its Hanhikivi 1 preparation. There is an atmosphere of trust and openness within the network, and the members share similar mind-sets and values regarding network collaboration. Though the network is otherwise open to new value-adding members regardless of their industry, the interviewee saw dissimilar values and interests as an obstacle to being allowed into the network. In line with the previously described network, this network also has a single company (represented by the interviewee) acting as a distinct driving force,
though decisions are made together and same rules apply to everyone. Also, the hub company is prepared to hand over that role if some other actor with higher qualifications for the task joins the network. At this stage, the network mainly has a preparatory and informational role for its members, and it mostly fits the description of a business renewal net. The network members are mutually sharing their information and contacts relevant to the Hanhikivi 1 project, and they have jointly explored the documentation and training requirements that will have to be met in a project of this nature. The interviewee saw the diverging backgrounds of the network members as a great asset during the preparatory and offer formation phases, as each member can approach the project from the diverging viewpoints of their specific industries, thus making sure each issue is more thoroughly analysed and covered, and that nothing is overlooked. Involving the network in such a large scale domestic project would also give certain qualifications for it to operate in other similar projects abroad. The interviewee regarded a situation in which the network would form a consortium that could jointly deliver a larger ensemble to the plant as an optimal result, but acknowledged the related uncertainty.

*An optimal situation would likely be the formation of some sort of a consortium that would allow us to offer services on a larger scope, as it would increase our chances of getting involved in the project. That would be the optimal situation. However, we must also accept that it might not necessarily succeed, or we might not find the right service configuration from the customer’s perspective.* (Int. 8.)

Previously there have been no concrete talks concerning such undertaking, as there has been neither a need, nor an opportunity for it. However, the Hanhikivi 1 project might facilitate and demand such a step to be taken, thus transforming the information network into a customer solution net with one façade in the context of this project. Such an arrangement would allow the network to limit the required interfaces from the customer’s perspective, as the customer would not have to hire the services from multiple actors, which in turn would create additional value for the customer. The network could also share a common base organization, and thus everyone would operate in the project with their own company name, while at the same time enjoying cost savings from the jointly organized basic operations. At this
point, all the agreements are merely on an informal base, and the network is still in a transition phase. This network will be later on referred to as Information network.

(3) Another strategic network was identified in an interview with a representative of an international consulting company operating in the energy and industrial sectors, that might be involved in the project as an inspector and/or consultant at the top project levels. The company has collaborated with some of its competitors in various projects preceding Hanhikivi 1, and there might also be a consortium between the partners in this specific context. The network could be described as sort of a loose horizontal customer solution net, where the company chooses to collaborate with its partners based on the nature of the project, or according to the specific customer in question. The project constellations have become rather constant when dealing with certain specific customers and/or projects. The network members are competitors who are each offering the same or partly the same services, and the goal of the network is to bring operational continuity, and to form uniform teams to fit certain kinds of projects or customer demands. By ensuring continuity in the composition of project teams, the network can be leveraged to achieve strong and tight cooperation, and the experiences from one project can be more efficiently transferred to another (Veenswijk et al. 2010; Grabher 2004). The network allows the companies to tap into external resources and additional know-how, and they can thus jointly offer larger service ensembles than they could on their own. Furthermore, by operating with well-known and familiar partners, the tasks can be more appropriately divided within the network and the risks are easier to estimate and manage. Each partners’ role may differ depending on nature of the project, and on the nature of the contract. It is difficult to estimate the impact the Hanhikivi 1 might have on the network, if it were to be utilized in the project. Considering the size of the company, the project might just be one among the many, though its complexity and scale might offer chances to tighten the collaboration within similar projects. This network will be later on referred to as Consultant network.

(4) The fourth network that was recognized is also a customer solution net, though it is a vertical one. The network operates in the industrial construction field, and the interviewed hub company has gathered a network of subcontractors it regularly uses in its projects. However, for some project areas the company will have to bring in
actors from without the network, as the regular subcontractors only cover a certain part of the likely construction process. The regular subcontractors are used according to the match between the requirements of the project at hand, and by taking the resources and capabilities of each subcontractor into account. All of them are familiar to the hub company that knows their individual strengths and weaknesses. Also, the additional partners brought from outside the network have to be somewhat familiar and well-referenced, as the interviewed hub company representative considered the inclusion of untried partners as unimaginable due to the intricate nature and requirements of the project.

*and of course it comes down to the old experiences, as we won’t go there to test new partners. It’s that kind of a work environment. In other projects and in normal industrial construction we can make individual try-outs, but I can’t even imagine if we received an order from Fennovoima that we would use completely new partners. It is the familiar partners that we trust.* (Int. 7.)

In addition, the company has been in preliminary talks with a competitor on potential collaboration within the Hanhikivi project, but no binding decisions will be made before the plant supplier, construction method and the construction schedule are known. The company was also involved in the construction of Olkiluoto 3 plant in Southern Finland, and there they worked with local subcontractors who became a part of their subcontractor network. However, these actors will not be transferred to the Hanhikivi 1 project, but they will likely be used if the company has further similar projects in the South. The interviewee saw that the company possesses all the requirements for being a primary contractor in project areas representing their industry, and therefore saw subcontracting as less desirable. Given the nature of the project, it might facilitate tighter collaboration within the net and cause movement towards the left side of the value system continuum, but it will still likely remain project based in essence. This network will be later on referred to as Construction network.

(5,6) Two of the interviewed companies mainly operating in the workshop, installation and maintenance businesses have so far done very little networking
related specifically to the Hanhikivi 1 project. Both companies regard themselves as possessing the required resources and capabilities to manage projects coming directly from the plant supplier, and at the same time they could also provide subcontracting to other actors. Both have signed contracts directly with AREVA on the Olkiluoto 3 plant construction project, and regard themselves as being capable of doing the same with the selected plant supplier in Hanhikivi 1. One of the companies is a member in a horizontal project consortium for demanding steel structures and equipment targeted to serve specific needs in energy, oil and gas industries. The company seeks to be involved in the construction, installation, maintenance and inspection of lifting equipment for the Hanhikivi 1 construction project, which is one of the areas the company has specialized in. According to the interviewed company representative, the consortium isn’t likely to be involved in Hanhikivi 1, and he rather saw the consortium partners as their potential subcontractors in the project if internal resources prove to be inadequate. The interviewee saw it very unlikely that other than their familiar partner companies would be included, and considered collaboration with unfamiliar partners as generally undesirable.

*If you have known each other for a long time and there is trust and openness, which is something you have to have in a project such as this, and you can’t have that with new actors. You have to know each other sort of. That is why one shouldn’t be too eager to join such a network arrangement, as you might end up being on the receiving end, while somebody steals your know-how and that’s it. ... when we start to talk about including outsiders, the threshold becomes high indeed. (Int. 4.)*

Given the close relationships and previous collaboration between the partners, there is potential for a relatively stable vertical network that could operate in other similar projects as well. As the partners are also competitors and share certain similar resources and capabilities, they could also theoretically form some sort of a new horizontal net, though the interviewee considered doing direct contracting as the optimal solution, and regarded their company to possess the necessary project related capabilities that their partners lack. The interviewed company isn’t larger than its
partners, though its involvement in the Olkiluoto 3 project may give it an advantage over its partners. This network will be later on referred to as Subcontracting network.

The other company is part of a portal consortium based on joint ownership, that has gathered together vertical and horizontal partners under a single umbrella name. The consortium has not been formed specifically for Hanhikivi 1 project, and it has existed for some time now. Also, the company has a set of regular and familiar suppliers, to whom they have been in contact with concerning Hanhikivi 1. Although the company has not completely ruled out the possibility of being part of a larger project consortium, the representative saw direct contracting to the plant supplier as the optimal alternative. The company has so far focused on developing their consortium network, and additional partners could be added to it, for example some of the company’s current subcontractors. Further networking actions will unlikely be done before the plant supplier is selected. All in all the network mostly resembles a horizontal market net, that aims at delivering enhanced customer value through combining different actor offerings. This network will be later on referred to as Portal network.

In addition to the described business networks, the municipal actors seeking to develop the business environment in their respective municipal areas have also joined their resources to benefit the larger geographical region. Though not business network as such, these networks formed by municipal actors and business developers, e.g. chambers of commerce, may have an important role in the formation of business networks, especially among the smaller companies and individual entrepreneurs. Even though no formal agreements have been made, the municipal business life developers of Northern Ostrobothnia have developed somewhat specialized roles that support each other and benefit all, at least to some degree. Information is gathered and shared within the network, and the advancement of the project is also closely monitored. Each actor plays a role in preparing the region and its companies for the Hanhikivi 1 and other large projects.
#### Table 3. A summary of the identified and presented nets.

<table>
<thead>
<tr>
<th>Network ID</th>
<th>Type</th>
<th>(Potential) Structure</th>
<th>Main purpose in the context of Hanhikivi</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Information</strong></td>
<td>Business renewal. May evolve into a customer solution net.</td>
<td>Loose information sharing and competence building network. May evolve into a tighter net.</td>
<td>Preparing for the project and eventual bidding phase.</td>
</tr>
<tr>
<td><strong>Consultant</strong></td>
<td>Horizontal customer solution net.</td>
<td>Project/customer based constellations. Hub can change depending on the project nature.</td>
<td>Advantages related to gathered collaboration experience. Extra resources and capabilities.</td>
</tr>
<tr>
<td><strong>Subcontracting</strong></td>
<td>Potential vertical supply or customer solution net (less likely).</td>
<td>Hypothetical. Stable and either hub driven or more egalitarian.</td>
<td>(Potentially) a stand-by source of resources.</td>
</tr>
<tr>
<td><strong>Portal</strong></td>
<td>Horizontal market network. Participation in other networks possible.</td>
<td>A portal consortium with joint ownership. Likely more-or-less hub driven.</td>
<td>Combining offerings to provide a more comprehensive collection of services.</td>
</tr>
</tbody>
</table>

Table 3 summarises the findings related to the identified business networks. The network types in this table represent the closest description of the said networks, and e.g. the Infrastructure network, while being primarily a horizontal customer solution net, also contains vertical relationships. Customer solution nets tend to be typical in construction projects (e.g. Möller & Rajala 2007), which is clearly true in the case of Hanhikivi 1 as well, since most of the identified networks fit more or less into this
category. The role of a hub company was clearly present in the identified networks, though more clearly in some and less clearly in others. In addition, many temporal alliance type collaboration and partnerships may form between companies seeking to participate in the project. Companies may have stable vertical supply networks that can be used within this project, though there may also be new kinds of demands that call for higher quality supply materials that meet the project specific demands. Given the standardization, regulation and nature of the project, it is unlikely that there is room for business nets representing the far right of the value system continuum. Therefore, in the following chapters the attention will primarily be on the two preceding network categories.

5.3 Network roles

While the main attention of the research is on the local strategic networks forming around the project, the relevant roles within and around the project network are discussed first, as these roles may have an effect on the formation and operation of the said networks.

5.3.1 Project network roles affecting the formation of strategic nets

Fennovoima has many important roles as the owner of the project. It is the driving force in the project and it is up to Fennovoima to raise the funding and to make the project happen. Being the project owner, Fennovoima also carries the responsibilities towards STUK, and they have to ensure that regulations are met at every project level. STUK’s responsibility is to oversee the project, and it primarily communicates with Fennovoima. Each actor must be aware of the basic rules and be capable of perceiving the specific part their products or work play within the larger project picture. As noted earlier, mutual understanding regarding the rules and requirements between the three main project actors, i.e. Fennovoima, STUK and the plant supplier, is also highly important to the successfulness of the project. Fennovoima has an important informative role within the project network, and it must also arrange audits to actors at different project levels to ensure the requirements are being met. For example, in the Olkiluoto 3 case, an audit conducted by the project owner revealed significant deficiencies in the quality and project management systems of a key
concrete supplier (Ruuska et al. 2011). The informative role is also visible in the networking of local companies, as Fennovoima has been regularly informing local actors of the phase of the project and about potential schedules, and they have also motivated local actors to take action in order to improve their situations in the eventual bidding phase. However, there has been no concrete collaboration between Fennovoima and the local companies so far. Still it is also in Fennovoima’s best interest to involve local actors, as it can raise the public image of the project, which is an important factor in nuclear projects (Sallinen et al. 2013). Though the project owner cannot demand the supplier to use certain actors, it can still influence their choosing through making recommendations and by championing certain standards.

The plant supplier, potentially together with its primary project partner(s), will divide the construction of the reactor and turbine buildings into smaller ensembles, the construction of which is then partly subcontracted to lower project levels. The plant suppliers have lists of audited and accepted vendors, to whom the tenders are eventually sent. To have the possibility of being involved in the project, the local actors must first be accepted into these lists. The project organization of the plant supplier might be quite complex, and matching one’s resources and capabilities to the needs of the right customer might not be so straightforward. Finding a suitable customer might therefore be difficult for the local SMEs, which is something where the plant supplier along with Fennovoima and other informants can help by informing the potential local actors of the construction arrangements, and by creating transparency regarding the potential project network. The plant supplier can also help in the realization of the project by investing in it, and thus becoming one of its financiers, which is currently negotiated between Fennovoima and Rosatom.

The municipal actors, who are concerned with the development of the local business sector, can also have an important role in preparing the local companies for the project, and in helping them to form networks through which the companies can increase their chances of getting into the project or to higher project tiers. Especially smaller and more inexperienced companies, that lack the proper resources and knowledge to prepare for the eventual bidding phase, can benefit considerably from the services of supporting municipal business developers. The key municipal business developers of Northern Ostrobothnia have arranged information,
networking, and training sessions that local companies have been invited to. Some also have specific strategic network programs, in which they have been involved in forming networks between companies that are seeking to enhance their chances of gaining access to the Hanhikivi 1 project. The municipal actors can help organizations to prepare for the project for example by motivating, by providing information and training concerning the project requirements, by providing specialist and consultant services e.g. on devising an appropriate business plan and on forming and managing the necessary strategic networks, and also by helping the companies to find the right potential customers from within the complex project organization. There has also been collaboration between the municipal actors and FinNuclear ry, which is a Finnish registered association for organizations within the energy business sector. FinNuclear provides different kinds of training, is involved in developing the Finnish energy sector, follows and informs about industry related news and developments, and it also provides a venue for finding potential partners from within the sector. Many of the member organizations have participated in the Olkiluoto 3 project, and these people possess and share important information regarding the realities and pitfalls of such projects, without divulging any strategically important know-how.

5.3.2 Roles within the strategic networks

In line with the presented theories (e.g. Möller & Svahn 2003; Hinterhuber 2002; Jarillo 1988), the importance of the existence of a hub, an orchestrator or a driving company was a reoccurring theme in the interviews. While a very loose consortium was seen as being viable without an evident driving force, most interviewees regarded some sort of a hub role as necessary in the formation of networks. The hub company might either be a clear leading force within the formed network, or its role might be to collect the network together, after which decisions would be made on equal basis. The role of the hub company was seen especially important in the case of horizontal networks, as it might be difficult to get the usually competing companies to join their forces. There also needs to be a single interface between the networks and the higher tier actor they are working for, i.e. the communication and documentation between tiers must be channelled through a hub company. In a vertical network the hub must ensure its vendors and subcontractors meet the
requirements and can properly handle the necessary documentation. One of the interviewees whose company had operated in the Olkiluoto 3 project said that their company had to help, guide and oversee their subcontractors from start to finish, as there obviously was a general lack of experience from working in a project of this nature. The smaller partners may also benefit greatly from the hub company’s name that can be used as an umbrella under which the offering is pooled, but they may also rely on the hub company to gain access to the project.

The hub company might also be replaced if another company has more to offer to the network. Some company might take a larger role during the formation of the network, but still seek for another company to take the responsibility for coordinating the network in the long run, as was in the case of one of the identified networks. Furthermore, some interviewees saw that one company might have the “lead” in one area of operations, and another company in some other area. It is also possible that the main purpose and the nature of a network changes as the network collaboration matures, which could affect and alter all the roles within the net, at least to some degree.

Due to the early phase of the overall project and the uncertainty surrounding it, many of the networks are still merely taking shape. Most of the interviewees regarded the roles different actors have in their respective (or potential) networks to be rather clear, though they acknowledged them to be subject to change. As the purpose and type of the network might be affected by the selected plant supplier and the chosen construction method, the potential roles network actors have may also depend on the requirements based on the eventual decisions. Also, a network may have a number of services it can potentially offer to different actors in various project tiers, and the decisions concerning which services to offer at which project tiers can profoundly affect the roles within the network. As mentioned earlier, the role of a network actor is partly dependent on its relative power compared to other network actors (Thorelli 1986), and if some actor possesses the bulk of the resources and capabilities required to deliver the network’s primary service, it has greater influence over the other actors. As the project progresses, some actor may take up a larger and more demanding role, while another actor’s role might diminish. Furthermore, not all members of a network may necessarily be involved in the actual project. Especially
within customer solution nets, some actors might be included just in case if their specific services were to be required at some point.

As discussed earlier, a company can also be a member in multiple nets. Given the scale and complexity of the project, one actor may very well be acting in various networks around the project. It might be, for example, the primary contractor on one ensemble, and a subcontractor in another. The relationships the company has in one network may be relevant to its partners in another network, and thus the company might have some sort of a gatekeeper role between the two networks involved in the same project. Also, interdependencies between the network actors may be altered as the collaboration continues, and this may weaken or strengthen the position of the members, and cause shifts in the network roles.

All in all, identifying any specific network roles, apart from that of the conventional hub and orchestrator, proved very difficult. The opportunity to further study the roles was limited by the stage of the project and that of the networks, by the secrecy surrounding the project and the networks, and by the scale and scope of the research.

5.4 Management in the identified strategic networks

Most of the interviewees had little specific viewpoints concerning the management of their potential strategic networks. Contracts were seen as the primary way of arranging the network, though some interviewees deemed the founding of a new joint company with shared ownership as the best or only way of ensuring commitment and success within the net. Some kinds of networks might be based purely on trust, familiarity and constant collaboration, such as the preparatory information sharing and training network mentioned earlier. This kind of arrangement might enhance the trust-building between network partners on the early phases of a network, but once larger investments and commitments come into play, more distinctive and binding agreements need to be made. The operation of the network can be arranged through contracts between the members, in which the roles, responsibilities, contributions, and levels of authority of the members are determined. Some of the interviewed companies had either planned to form a joint company with their network partners or saw it as a plausible possibility. The management for such a company could be
brought from outside, or it could be carried out by the network members according to their respective stakes in the company. The stakes could be distributed equally, in proportion to the respective contributions of individual companies.

Only the largest interviewed company told they had specific predetermined guidelines on how to deal with disagreements and disputes within their networks. The representative highlighted the importance of network management, and regarded planning, monitoring and pre-emptive conflict resolution systems as necessary. The representative perceived that conflicts within a network must be solved as quickly as possible, or they will fester and hinder the collaboration in the future. Being a rather large international company, the organization obviously has more experience from networks and their pitfalls compared to the local SMEs. The SMEs had seemingly paid smaller attention to planning the management of their potential networks, though some of the networks were still either on tentative or very early phases.

Careful partner selection was also seen as a way to ensure smooth collaboration. Choosing the perceivably right partners to work with when forming the network will certainly make it easier to set common goals and to build mutual trust. It is not only about selecting the right companies, but one must consider the people as well. Especially among smaller companies the personal chemistries between entrepreneurs and key employees of different network actors can either set huge obstacles for coordinating the network, or facilitate successful collaboration. Even when the network offers clear advantages to its members, if the key people cannot cooperate or find some common ground, the collaboration will surely fail. Also, the economic and resource situation of the potential partners must be considered. The other networks a potential member is involved in can also play significant roles in the selection process, as the actor’s relationships to other networks may either add value to the network in question, or serve as sources of potential conflicts in the long run. As mentioned before, the actions a company takes in one net also affects the other nets the company is operating in (Möller & Svahn 2003).

In line with the previously described theories (e.g. Ford and Mouzas 2008; Gadde et al. 2003; Håkansson & Ford 2002), the conveying and understanding of each other’s goals, perceptions and views was also regarded as highly important in managing the
networks and network collaboration. The partners need to be clear about what they are expecting from the collaboration within and after the project. Within customer solution nets where the actors are highly interrelated, and where the resources of network actors have been pooled to manage the project, network wide learning and problem solving requires mutual communication, sharing of expertise and knowledge, and bridging of the borders between the firms (Möller & Rajala 2007). Efficient planning, network coordination and quick decision making require open communication, which in turn calls for building of trust between the partners. As said, few interviewees regarded it possible to include unfamiliar members into their networks. Within some of the identified customer solution nets there was a need for new revenue logics that would distribute the gains and risks between the members fairly. Möller and Rajala (2007) regard the distribution of the business renewal benefits as one of the key issues of business renewal nets, as the chosen solution should be motivating for all network actors.

As the offering a vertical demand-supply network produces is usually an outcome of combined interdependent value activities and resources of specialized network actors, the integration of the varying value activities requires a high level of determination and transparency within the network (Möller & Rajala 2007; Möller et al. 2005; Achrol & Kotler 1999). The integration of parts and work require the related knowledge to be highly codifiable and transferrable between the serially interdependent partners (Möller & Rajala 2007). Therefore, there needs to be qualifications for efficient communication and proper supporting IT systems, which is also important in horizontal market nets (Möller & Rajala 2007). All in all, the importance of suitable IT systems is highlighted in the case of megaprojects, as unified documentation, project coordination and reporting, and the codification of project specific tacit knowledge calls for efficient supporting systems. Especially in customer solution nets where the project constellations can change, transforming the project specific experiences into codified data could enhance network-wide learning and distribute important bits of accumulated project specific know-how to the network members who did not participate in that particular project. Also, in networks where the members are highly specialized, each actor most likely has the best conception of their own role in the larger value system, and therefore benefits may be gained through shared coordination, since if the hub coordination is too tight, the net
could lose its capability for exploration and learning (Möller & Rajala 2007). Furthermore, appropriate IT systems are not only relevant in managing a strategic network, but they are also pertinent in bridging and integrating the focal nets into the primary megaproject network (Chung, Kumaraswamy & Palaneeswaran 2009).

5.5 The forming and evolving networks

Even though most of the strategic networks identified during the research were based on existing partnerships and relationships, the networks haven’t been all that active concerning the Hanhikivi 1 project. The networks are still more or less on their initial phases and merely forming up, and it is thus hard to estimate the ways in which the networks will develop and change. The examination of the network’s evolution paths will be mainly hypothetical, though the presented and discussed factors and actions affecting the strategic network development are likely to steer the networks into certain directions, to some extent.

Earlier it was argued that the development of strategic networks is dependent on the relation between the network type, network roles and network management. These three represent the internal factors affecting the development of a strategic network, but they do not cover all of the factors affecting the formation phase of a strategic network in the context of mega-projects. The factors affecting the formation of strategic nets in the context of Hanhikivi 1 were discussed earlier in chapter five, and in addition to the network and member related internal factors, external megaproject network based factors were also introduced. These project based factors, as discussed before, can have a significant role in the formation phase of strategic networks, as they can affect e.g. the network size, the selection of members, and the nature of collaboration between the network partners. Whereas the megaproject based factors are mostly relevant in the formation phase of the strategic networks, some of the strategic network and member related factors are closely or even inherently linked with either network management or network roles, and thus have a more significant impact on the evolution of the network in the long run. All in all, the presented factors influence the network type, the roles within it and also the management of the network, thus laying foundation for further network development and evolution.
Most of the identified networks were still taking shape or were on a conceptual level. The relative importance of the presented factors affecting strategic network formation depend on the potential strategic network and member context, and thus some factors might be more significant in determining the first steps of one strategic network, while other factors might be more visible in the formation of a network operating under different circumstances. The development paths the networks take next are mostly dependent on the nature of the plant construction process, as further commitments and plans of potential network actors are prevented by the uncertainty related to the project. The first step in the previously presented Partanen and Möller (2012) strategic network creation framework is to identify the value creation activities required by the customer. These activities cannot be fully identified before vital project specific information is revealed. Similarly, the realization of recognized potential network opportunities, relevant in the first stage of the presented Ojasalo (2004a) network creation framework, cannot be precisely estimated before customer needs are made clear. Therefore, once the network actors are aware of the requirements at the customer’s end and possess a more precise view of the network requirements and potential, they will be able to further configure the networks and to make further commitments that will move the networks forward and create the opportunity and will to tighten the collaboration between the actors.

Figure 5 summarizes the formation and expected development of strategic networks in the context of Hanhikivi 1. It does not seek to exhaustively describe the concrete steps in the formation of the networks, but rather illustrates the general phenomenon in the context of the Hanhikivi 1 megaproject. Before receiving the final specifications of the project requirements, potential network partners possess some level of initial awareness concerning the strategic network formation factors presented in chapter 5.2.1, which enables the actors to start preparing, planning and tentatively mapping potential network opportunities. The actors can prepare for the upcoming project either individually or jointly, e.g. the way the Information network has done, and they can also make initial networking plans based on the state of the known strategic network formation factors. Through the mapping of potential network benefits and potential partner constellations, the actors can gain an initial view of the existing match between the expected project requirements and the assumed network synergies. Thus through mapping the network’s purpose and likely
value creation logic, the required network type and characteristics can be preliminary explored. From the perspective of network management, the distribution of power and initial network pictures within the potential network may begin to take shape early on, though changes will likely happen if new members join the network, and as project specifications are further revealed. The actors may also seek to steer the network plans into certain direction, either jointly or individually. Some initial network roles, perceptions of them, and an initial member constellation may also start to take shape, and it is likely a distinct hub company emerges that orchestrates or drives the network development.

![Diagram](image)

**Figure 5. Formation and development of strategic networks in the context of Hanhikivi 1.**

Some sort of an actual network may start to form already at this stage, but it is unlikely that any binding agreements or contracts will be made based on assumptions and limited information, and thus the purpose and shape of the network remains variable. The permanent networks of exiting customer solution nets may require less network preparation than newly formed networks, for they have some level of continuity and stability in their network operations.

Once the necessary project related information becomes available, the official efforts towards forming a long-term strategic network may truly begin. When the actors
become aware of the final project requirements relevant to their operation, they can make further commitments regarding network cooperation, as well as actual network and project investments. If the combination of the formation factors favors the establishment of a strategic network, such a network will be pursued. While some of the networks may have had a clear conception of the value creation logic and purpose of their network, other networks may have to reconfigure their plans if the final project specifications do not match their original expectations. If there is a wide gap between the expectations and realized project specifications, even the network type may require altering. Once the project requirements become known, the networks can elaborate the purpose of the network, and refine the actual member constellation and roles within it. Once the networks begin their operation, network coordination and mobilization come into the picture, and the distribution of power may become clearer. The network formation process has been previously discussed, and due to the early stage of the project and the related networks, the gathered empirical data does not warrant detailed further elaboration. Some networks may follow the formation steps presented by Partanen and Möller (2012) and Ojasalo (2004a), while others may take slightly different paths, e.g. the Information network that did not quite seem to be following either one. Furthermore, the formation of temporal project based networks within existing customer solution nets, e.g. in the case of the Consultant network, may or may not follow similar steps as the newly forming networks.

As stated by Halinen and Törnroos (1998), networks are in a constant state of evolution, and to illustrate this phenomenon the network evolution framework presented in chapter 3.5 represents the final step of this framework. The network type, role and management related issues will continue to shift as time passes. The paths different network take will vary, though each of their evolution will be influenced by the respective network type, management, and roles (as elaborated in chapter 3.5).

The Infrastructure and the Information networks were open for more members, with the former looking for a new network driver, and the latter seemed happy to take aboard any like-minded value adding partners upholding similar values and views regarding the potential network cooperation. The Infrastructure network has a quite
clear purpose and a specific network goal, though the network formation is still lacking a more permanent network driver. The nature of the Information network’s involvement in the Hanhikivi 1 project is still vague, and it might develop into a tighter customer solution net, or remain as a loose information sharing and capability building network. As stated before, Hanhikivi 1 might present a chance for tightening the network collaboration, and the overall development path of the network could be highly determined by the level of collaboration within this particular project.

The Portal network was also potentially open for new partners but overall it seemed more stable than the Infrastructure and the Information networks. The Portal network was more concerned with expanding their general portal consortium, and the interviewed company was still waiting on further project developments before taking action. The Consultant and the Subcontracting networks might or might not become a reality in the context of Hanhikivi 1, depending on the nature of the construction method and related potential contracts. The Consultant network seems to be a quite mature but a loose network, that is the result of long-term collaboration between various competitors on many different projects, and that has constant partner constellations when dealing with certain kinds of projects or with specific customers. Whether a temporal project network in this particular context is formed or not, depends on the nature and level of required services. The partner constellation of the temporal network could become standard within the customer solution net for similar projects and tighten the collaboration between the involved partners, but it is unlikely that the permanent net undergoes any radical changes during the project. The realization and nature of the Subcontracting network depends on the size of the ordered product/work ensembles, and on the opinions and individual capabilities of the potential partners. If the company can do a direct deal with the supplier it most likely will, though as mention before, either a vertical supply network or some kind of a horizontal net could theoretically be formed. However, if the partners acquire the means to enter the project on their own, it is unclear whether the partners would be willing to do mere subcontracting, that was seen as less preferable by the interviewed company itself.
The Construction network is somewhat stable and partly open for new members whose inclusion might also depend on the construction process. The new temporal network members could become members of the permanent customer solution net, as happened during the Olkiluoto 3 project. The interviewed company will also retain its strong hub position, as the smaller partners are dependent on the company’s contribution.

Depending on the presented factors and on how the project proceeds the networks may grow, diminish, change in type and purpose, or they may fall apart if the project fails or if certain network goals are not met. Network evolution is, of course, also dependant on changes in the network’s external environment (Halinen & Törnroos 1998), and critical events may cause incremental or radical changes within a network (Halinen et al. 1999). However, it is difficult to forecast these events, excluding the factors related to the megaproject network that were presented earlier, and the research focus has been on internal network and project developments. The roles of the members may change, and the hub that was active in the formation and network building phase might not possess the prerequisites to lead the network in the long run, and thus a new network hub might be needed. Most of the interviewees acknowledged the need to develop the networks according to changing requirements and conditions, and regarded adaptation to be necessary. As the networks become more determined, new dependencies between the actors may arise, and the nets may also form links to other strategic networks within the overall megaproject network. Forming interdependencies may affect the development paths of the networks, as interdependencies between network actors can be seen as a major force in network dynamics, causing stability and network rigidity, and leading to inertia between the actors (Halinen et al. 1999).
6 DISCUSSION AND CONCLUSIONS

6.1 Discussing the findings

There are currently two Finnish nuclear plant construction processes in the works with potentially significant impact on local businesses, both large and small, which makes the study of megaprojects a very topical issue in Finland. This research examined the formation of long-term strategic networks in the context of megaprojects, and brought up the relevancy of the said networks in the project participation, especially from the perspective of relatively small local companies. The question of network formation and development was approached through a set of sub-questions that concerned the factors affecting the strategic network formation around the case megaproject, and the types, member roles and management of the forming networks. Furthermore, the primary project network and the actors influencing it were also discussed, as they can have a significant impact on the formation of strategic networks, especially in the case of smaller potential actors. In order to answer the research questions, existing literature and theories regarding megaprojects, business networks and strategic networks were presented, and a set of interviews with organizations either directly or indirectly involved in the project were also carried out.

Various factors affecting the formation of strategic networks around the Hanhikivi 1 project were identified. These factors were divided into three main categories that comprise of factors arising from the primary megaproject network, from the potential network member itself, or from the potential strategic network. The presented factors may either facilitate or hinder the formation of strategic networks in a particular setting, though the relative importance of each factor and the relationships between them were out of the scope of this research. Some factors could be more visible in the formation of a network operating in a certain context, while other factors might turn out to be more significant under different circumstances. These factors are likely similar that can be found in other construction megaprojects within the private sector, though the generalizability of the findings still calls for further testing.
Several different networks were recognized during the interviews, and these networks were presented and discussed in chapter five. The networks were mainly consistent with the first two categories of the Möller and Rajala (2007) business network classification framework, while the third category was expectedly absent as the nature of the project and the related requirements leave little room for radically innovative networks. Vertical and horizontal customer solution nets were common, and vertical demand-supply nets of individual strategic network members were also referred to. The large amount of customer solution nets can be explained by the nature of the project in question, and by looking at the potential related to future network continuity in other similarly large construction projects in the area. Customer solution nets are common between actors that operate in project based businesses, especially in the construction industry, and that possess complementary resources and capabilities (Möller & Rajala 2007). What separates solution nets from the other network types is their temporal project-based constellations, that are formed from the more lasting core network according to the requirements of the project in question (Möller & Rajala 2007). Furthermore, the identified networks were all based on previous relationships and familiarity, and some of the networks had existed in one form or another even before the Hanhikivi 1 project. The networks are mainly formed or utilized in order to being able to provide larger ensembles, to share project related risks and to cut costs, to gain new collective capabilities, and to increase the likelihood of gaining access to the project.

In line with earlier theories (e.g. Möller & Svahn 2003; Hinterhuber 2002; Jarillo 1988), the importance of the role of a hub firm or/and an orchestrator was strongly present in the interviews. Some of the interviewees also made a distinction between the network orchestrator and driver roles, as the management and further development of the network might require a different hub company than the one responsible for the network creation phase. Most of the interviewees also saw the roles as alterable, and considered the role of the hub as potentially changeable. Overall, the interviewees saw the network roles of their potential partners as quite clear, and expected them to be determined by their respective roles within the project. However, as discussed earlier, the network roles are not merely related to the concrete function an actor has in the network, but they also cover other less measurable attributes, e.g. shared histories and member held perceptions, that can
also influence the network and operation within it. In order to examine other specific network roles within the identified nets, a more extensive further research would have to be conducted. The different roles the network members have in the evolution of their networks will likely become more distinctive as the project progresses and as the networks mature.

The research provided additional information concerning management in strategic networks in the context of a construction megaproject. Four alternative options to arrange and manage the networks were identified. First, the network could be based on trust and familiarity, and involve no official agreements or joint ownership. Such an arrangement could work on the initial phases of a network, but once larger investments are required, binding contracts will have to be devised. Another option is to base the network and its management on contracts that encompass the responsibilities and authorities of the network members. Finally, the network members may also seek to enhance commitment through joint ownership, for example by forming a joint company that is managed either by managers from within or without the network. Careful partner selection was also seen as a major element in ensuring successful network management. Selecting the perceivably right and familiar companies and people to work with was seen as an important mean of preventing conflicts and management issues in the long run. Besides frugal partner selection, little attention had seemingly been paid to pre-emptive conflict resolution, with the exception of the largest interviewed company, and contracts were seen as the main vehicle in keeping the network partners in check. In line with Håkansson and Ford (2002), many interviewees regarded the conveying of one’s expectations, opinions, and perceptions of the net as highly important. Some of the interviewed companies also saw the preparation of a working revenue logic as a crucial question in achieving a fair and sustainable way of sharing the profits and risks between the network partners. Furthermore, the efficient communication, documentation handling, and project management also call for efficient supportive IT-systems and structures.

Overall, the plant construction project has not got to a point where even the most active of the identified networks could have taken more concrete steps towards reaching a somewhat final network configuration, or towards creating more specific
and detailed plans. In the absence of the final project specifications there can still be some level of networking going on, as the potential network members map the network potential and potential actor roles, and as they seek to influence the development of the potential network. Once the plant supplier is officially selected and the nature of the construction process is clear, the networks will likely become much more active and determined, unless the originally conceived potential of a particular network doesn’t match the selected construction style or related requirements, or if there is an obstructive mismatch between the other formation factors. Once the network is formed, it will continue to evolve as time passes. A network’s internally driven evolution takes place through network management and changes in network roles and type. This research doesn’t take into account other external factors in strategic network development, besides those that arise from the project and its central network themselves. The discussed megaproject, potential network, and potential member related factors influence the formation of strategic networks and they may also affect the ways in which the network continues to evolve. Chapter 5.5 discusses potential directions the identified networks and other nets in similar circumstances might take, though any detailed hypotheses of potential further evolution paths are not provided.

6.2 Theoretical and managerial contributions

This research examines the formation of strategic networks in the context of a construction megaproject, and it provides a glimpse on the early phases of strategic network evolution in this particular setting, thus making contributions to both megaproject and network related literature. The research gives insight into the prerequisites, conditions and other factors affecting the formation of strategic networks in the context of construction megaprojects, illustrates the development and evolution of these networks, presents the benefits and limitations of the said networks, and discusses the management and roles within the networks. Though the overall generalizability of the findings is not further examined, they may still be relevant in regard to strategic network formation and development in various other contexts as well.
The Möller and Rajala (2007) strategic network classification framework was also further elaborated by successfully applying it in the specific context of this research and in a more stable industry setting, thus extending its applicability. The framework worked well in defining and categorizing the identified networks, though as pointed by Möller and Rajala (2007) themselves, there is an existing gap between real-life networks and the framework. Therefore, though the limited scope of this particular research prevented the creation of a more specific framework, more detailed and industry/situation specific strategic network classification frameworks could be devised, to allow further categorization of diverging networks.

Though the theoretical contributions of this research are more predominant, it also has several managerial implications. The research gives insight into the considerations potential network members may go through when deciding on forming or joining a strategic network. This sort of information can be valuable in the formation phase of a network not only from the perspective of the strategic net in question, or that of the local municipalities, but also from the perspective of the overall project network, as by understanding the process of networking between local SMEs, the project owner may, for example, seek to support local involvement in the project. The research and its contents may also be used to steer managerial attention towards relevant issues in strategic network formation and development, especially in the context of megaprojects, and though it might not provide definitive answers on successful network creation and development, the presented theories and models can serve as a starting point to ensuring continuing successfulness of planned strategic networks.

6.3 Limitations and suggestions for further research

Even though the research sought to examine the formation and development of strategic business nets in the context of construction megaprojects, the gathered empirical data mainly concerns the formation phase of the networks, while the discussion regarding later network development was mainly based on existing theories. The timeframe in which the empirical research was conducted was quite short, and the further examination of the networks formed in the context of Hanhikivi 1 would require a longitudinal research. For example, the event-based tools proposed
by Halinen, Törnroos and Elo (2013) designed to examine network dynamics and processes could be used in the context of a longitudinal study on the network evolution process. Given the uncertainty regarding the project schedule, it is hard to estimate an appropriate research timeframe, though examining the changes and developments in the identified networks might yield interesting and valuable information. Furthermore, the ways in which the networks are affected by the conclusion of their respective contracts within this particular project, and the continuity and nature of the network collaboration after the project should also be examined.

Most of the interviewees represented companies operating either as network hubs or orchestrators, or had no direct involvement in strategic nets forming around the project. Furthermore, as the project was still on a very early phase, the networks were still forming or were on a conceptual level, and there was still some secrecy involved concerning potential partners and member constellations, which hindered the examination of members’ roles within the identified networks. The interviewed companies were mainly local SMEs, and interviewing larger companies potentially involved in the project might have provided further insight into the matter. Moreover, in order to identify more generalizable network roles, the identified networks should be studied in further detail and on various levels during and after the construction process. There were similar issues related to investigating the management mechanisms within the networks, as most of the interviewees seemed to be less concerned with network management related issues at this stage of the project.

It is also unclear to what extent the presented factors affecting the formation of strategic nets are generalizable in the context of other construction megaprojects, or megaprojects in general. Project and network development may differ between countries and locations, and as laws and regulations can vary a lot, especially those related to construction of nuclear power plants, plant construction is always country specific to some degree. The presented factors and other findings could be put to test in other similar megaproject scenarios.
REFERENCES


