Partnering in construction
– Relationship connectedness

Lena Bygballe

Norwegian School of Management, BI

Nydalsveien 37 0442 Oslo

Norway

lena.bygballe@bi.no

Marianne Jahre

Anna R.S. Svärd

Norwegian School of Management, BI

Abstract

The purpose of the paper is to explore into relationships in the construction industry. Relationships have been primarily related to partnering in this industry, which is a 'hot' concept at the moment. In general, partnering means close cooperation between customers and suppliers. However, there is '[n]eed for more systematic and in-depth research which examines the nature, efficacy and feasibility of a partnering approach' (Bresnen and Marshall (2000, p.229). Supply chain management (SCM) is another topic given increasing attention in construction (see e.g. Akintoye et al 2000, Love et al 2004, Proverbs and Holt 2000, Vordijk et al 2000). The SCM perspective views the construction industry as a set of companies that form sequentially linked activity chains, i.e. supply chains, where output from one activity becomes the input for the next (Håkansson and Jahre 2005). While the traditional construction literature focuses on partnering from a dyadic perspective, the SCM literature acknowledges "sequential connections" between contractor-sub-contractor relationships and contractor-client relationships.

In the SCM as well as in the partnering literature, little attention has been given to other relationships beyond the dyadic and sequentially linked ones. We suggest that the understanding of relationships in construction in general and the marketing side (i.e. relationships between a client and a contractor) in particular, cannot be captured by the traditional concept of partnering. Instead there is a need of an understanding of the connections between various relationships. This may involve relationships a contractor has with its suppliers and the connections between these, as well as connections to other relationships. While the SCM literature contributes to our understanding of sequential links, other types of relationship connectedness will be understood based on insights from the industrial network approach (INA) (Håkansson and Snehota 1995). Furthermore, INA will be used to understand the substance of such relationships – aspects that have not received much attention in the traditional literature on partnering in construction. Hence, we want to contribute to the understanding of relationships in the construction industry that goes beyond the traditional views of partnering by introducing the concept of relationship connectedness and developing a conceptual framework for studies of relationships from an INA point of view. The paper at this stage is mainly conceptual, starting with a small empirical example for illustration purposes.

Keywords: Construction, Relationship connectedness, partnering, supply chains

Introducing the research idea - The New Bislett Stadium project

Berlin, Germany - Sunday, the 4th of September 2005: Tatyana Lebedeva wins the Golden League Jackpot of one Million Dollars for the 2005 season, and is the only athlete this summer to win all of the 6 Golden League events. One month earlier she duly won her third victory of the season at the new Bislett Stadium. The games had returned to Oslo after one year in Bergen and the world press as well as contenders and spectators agree that the reopening is a success. A world stadium built on tradition has been able to preserve the feeling of closeness to the athletes and the field. The mayor of Oslo, Per Ditlev-Simonsen opened the games in the presence of the King and Queen of Norway, as well as the IAAF president Lamine Diack. The Mayor pointed out that "The opening of the new Bislett stadium is an important event for Oslo…and I am convinced that Bislett will create new enthusiasm for the athletics for generations to come….".

The shape and form of the old stadium has been reproduced with a slight shift to the northeast to allow for more spectators. The number of lanes has increased from 6 to 8, as this is the norm for the modern stadiums today. The architect, CF Møller, has put an emphasis on preserving the relationship between the arena and the city by using Bislett square and Lørdahls square as boundaries against the stadium rather than conventional walls. The stadium has so far cost MNOK 450 (56.9 million euros) and is said to be a world record in its own right as it was torn down and re-built in only 15 months.

The new Bislett stadium truly has a long history to look back on – there has been an athletic field here since 1908. The first tribunes and roof were built for the world speed skating championships in 1925 and the stadium was further improved for the winter Olympics in 1952. Bislett Stadium can look back on 19 world records in speed skating and 62 world records in track and field. In recent time sport officials demanded an upgrading of Bislett stadium, especially after it lost important international track-and-field events. Politicians used a period of about 10 years to decide what to do with the site, the discussion evolving around whether to refurbish the old stadium or build a new. The state antiquarian was heavily involved in the early stages regulating the design of the stadium in close co-operation with the Department of Culture and Athletics (Kultur og Idrettsetaten) in Oslo Municipality as well as the architects from CF Møller. During this period three different building committees were involved as counselling. Finally, in 2004 the Conservatives and the Labour Party called a truce and it was decided that the old stadium should be torn down and a new one resembling the old would be built on the site.

The building started in August 2004. Terramar AS was hired by the client, the Department of Culture and Athletics in Oslo municipality, as responsible for project management. Based on a tendering process, NCC was chosen as the main contractor. Erstad & Lekven AS was responsible for construction site management, hired by Terramar. This was partly due to a close relationship between the project leader from Terramar and the manager from Erstad & Lekven AS. The architects from CF Møller Norge AS, as mentioned, had been involved since the discussions around solutions for the Stadium began ten years ago. The architect had a contract with the client up to April 2004, when the contractor, NCC, was hired. Then CF Møller was transferred to NCC. The following actors were also important during the construction phase: Olav Olsen AS, the consultants on concrete, Siemens AS, responsible for the electric and electronic system such as lightening, Spænncom AS, who delivered concrete elements, Eriksen & Jensen AS, responsible for the plumbing, Kolberg AS responsible for ventilation, Fiskum plate og sveis AS, who delivered the steal constructions for the ceiling, and Polytan AG, who was responsible for the tracks. In addition to these there were different interest groups that were highly involved, both before and after the actual building started. For example the users, represented by among others the Bislett Alliance and Oslo Idrettskrets (Oslo athletic federation), were important. The Bislett alliance represented a consortium of the three athletic associations responsible for organizing the Bislett Games. They were involved in decisions concerning facilities and design issues important to fulfil international standards. In addition the neighbours of Bislett Stadium were considered as important stakeholders as the arena is situated in the heart of Oslo. The figure below is an illustration of the main actors involved and the connections between them.

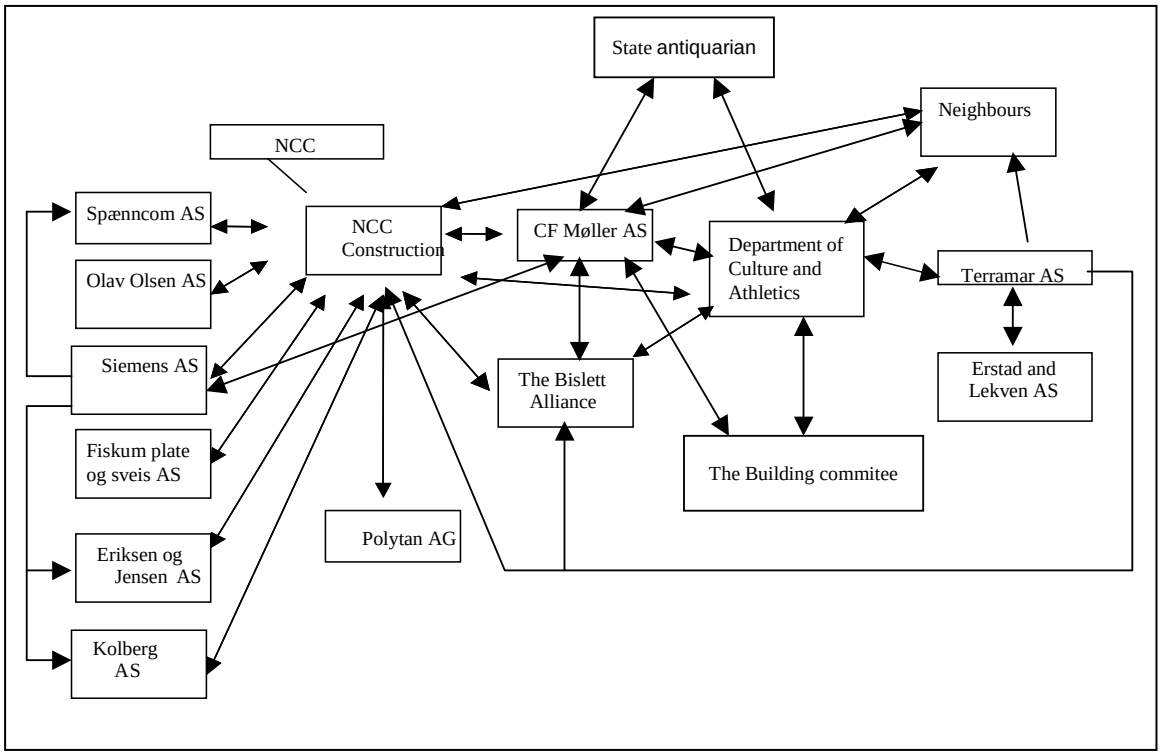

Figure 1. The main actors involved in the Bislett project and the connections between them

As the figure illustrates there were a myriad of relations and actors involved in the project. If we look at the different subcontractors for example, these were dependent on each other in different ways. The connection between Siemens and Spænncom illustrates this quite well. This dependence was primarily due to the need to co-ordinate the placement of lightning relative to concrete elements on the construction site. There was also a need for co-ordination with plumbing and ventilation as some of these parts had to be done before lightning and vice versa. NCC had established agreements with Olav Olsen and Siemens prior to the main tendering stage while the other subcontractors were chosen based on a tendering process after NCC got the project. NCC had used Fiskum on earlier occasions while there were no previous established relationships with the other subcontractors. It was later found, however, that NCC Denmark had Spænncom as its preferred partner on concrete elements.

The construction period was clearly characterised by time pressure and the need to find parts of the facility, which could be constructed after the Games. Prefabricated concrete elements from Spænncom in Denmark constituted a crucial aspect with regards to saving time. The time pressure also served as a buffer against disputes as all parties knew that possible conflicts would have to be solved quickly in order to finish in time for the Games. The absolute date of Bislett Games was a very clear deadline and an obvious goal that all involved actors was able to relate to. The parties participated in teambuilding processes, where they agreed on how to approach the project. There were also weekly meetings in the beginning of the building period between the parties, involving among others the client (represented by Terramar), the architect (C.F. Møller), the contractor (NCC) and sub-contractors (i.e. Spænncom). These meetings concerned technical issues, progression, and co-ordination of the interfaces between the actors. The personal chemistry was important in this respect. The frequency of these meetings decreased throughout the period. However, weekly co-ordination meetings were again on the agenda the last 6 months before the Games, where the parties, including the users, discussed problems and how to solve these. In addition to these meetings, the Building Committee also had meetings, where several of the different actors were involved.

The project was of great public interest and attracted much media attention. Being an arena of long traditions, the building of the new Bislett Stadium attracted many with strong opinions on what was best for the city and the stadium. This was also one of the reasons behind the ten-year dispute in the Oslo municipality. It was considered to be a prestigious project for the involved parties something that further encouraged co-operation, as a failure would have been very harmful for the reputation of everyone involved. Following Bislett Games the construction process somewhat slowed down and as Terramar puts it - it should have been yet another Bislett Games in November, to keep the interest and enthusiasm high. Nevertheless, the good atmosphere in the project contributed to encouraging further work and the client took over the building as planned in December 2005. There is however still some work and improvements to be done, and this will continue till May 2006.

The Bislett project exemplifies what the Norwegian construction industry (as in many other countries) has experienced the past 5-10 years with an increased attention towards closer cooperation. Research projects as well as conferences focus on cooperation and partnering concepts. Some individual companies have developed their own partnering approaches. Experiments with different contract regimes are taking place in a number of projects. While some are concerned with developing more formal partnering agreements, e.g. through the contracts, others focus more on how to develop the relationships within the projects in a more informal manner (Swärd 2006). The Bislett example is intriguing in that even if the contracts were traditional, all actors involved claim that close cooperation developed between the actors and had to do so due to the strict goals and absolute deadlines. Accordingly, the example provides an interesting starting point for a discussion around different aspects of the partnering approach in construction.

Introduction and purpose

Construction is an industry where partnering is considered really 'hot' at the moment. In general partnering means closer co-operation between customers and suppliers, but it is argued that there is a '[n]eed for more systematic and in-depth research which examines the nature, efficacy and feasibility of a partnering approach' (Bresnen and Marshall (2000, p.229) and this 'might benefit significantly from drawing on frameworks and findings from mainstream organisational theory and research…..'(p.235). According to the same authors, studies of partnering in the construction industry have mainly been directed to relationships between clients and (main) contractors, although there is an increasing focus on partnerships also between a contractor and its subcontractors (e.g. Constantino et al 2001, Dainty et al 2001, Winch 2001, Humphreys et al 2003). The focus on partnering in general, and more recent on supplier relationships in construction, might be explained by the fact that the share of purchased service/material for contractors in many cases has doubled since the 1980s. This implies that a large share of the work being done either in the form of materials or components supplied to or in the form of actual man hours performed in a project is done by actors outside the focal organisation, i.e. the contractor.

Supply chain management (SCM) is another 'hot' topic in construction (see e.g. Akintoye et al 2000, Love et al 2004, Proverbs and Holt 2000, Vordijk et al 2000), in spite of the fact that the industry is considered to be different from other types of production (Vrijhoef and Koskela 2000, Ballard and Howell 2003, Winch 2003). SCM views the construction industry as a set of companies that form sequentially linked activity chain, i.e. supply chains, where output from one activity becomes the input for the next (Håkansson and Jahre 2005). What is interesting for the purpose of this paper is that SCM is concerned with how a company's customer relationships and customer service is completely dependent on the relationships the company has with its suppliers.

While the traditional construction literature focuses on partnering from a dyadic perspective, the SCM literature acknowledges what we may call "sequential connections" between contractor-sub-contractor relationships and contractor-client relationships. In other words, the former relationships are seen as important for the latter relationships, in terms of providing necessary inputs. However, despite this recognition, prior research in construction has given little attention to the connections between relationships beyond these sequential kinds. In this paper we argue that the focus on dyadic relationships

in construction, captured by the traditional concept of partnering is insufficient in order to understand relationships in this industry. The construction industry involves many different actors and hence there is a need of co-ordination between multiple units. Our point is that in any construction project a relationship to the client must be linked to the relationship the contractor has with the suppliers, in line with the common approach in SCM.

What we need is a perspective that provides a broader view of relationships and partnering. In this paper we will use insights from the industrial network approach (INA) (see for example Ford 1990; Axelsson and Easton 1992; Håkansson and Snehota 1995) to understand this broader context of partnering. INA provides an approach to understand connections between actors and relationships in industrial networks, arguing that such connections create interdependencies that provide both possibilities and constraints to the involved actors. Compared to the SCM literature, INA includes connections between relationships beyond sequentially linked relationships, such as connections between a contractor's relationships with two different sub-contractors. In the traditional partnering literature on construction, most focus is put on the actors, and partially on the activities. INA on the other hand provides extensive descriptions of the content of relationships, including not only the actors and activities, but also the resources involved. As such, INA contributes not only to a broader perspective of the context of partnering in construction, but also opens up for more extensive qualitative descriptions relationships in construction.

We thus suggest that an understanding of relationships and partnering in general and the marketing side, i.e. relations between a client and a contractor in a construction project in particular, requires the inclusion and understanding of the connections between the various relationships that exist in construction. First, the supplier relationships that provide output that become the input to the contractor and thus the client (from SCM), are important. Second, the connections between other relationships, such as the contractor's relationships with its different suppliers (from INA), are important. Accordingly, the purpose of this paper is to contribute to the understanding of partnering in the construction industry by introducing the concept of relationship connectedness and developing a conceptual framework for studies of relationships in construction. The paper at this stage is mainly conceptual with its main purpose of opening up the discussion. The next section goes through the literature on partnering and supply chain management within construction before we link it to the industrial networks approach. The paper concludes with important aspects of our framework exemplified by use of our empirical example and the implications for studies of relationships, in construction.

Partnering in construction – prior literature

As for other industries, the share of purchased services, materials and components is increasing also in the construction sector. For example, main contractors have been purchasing increasing amounts of labour and material, which now represent about 75% of main contractors' turnover. This has led to a focus on relationships between suppliers and customers, even if the culture of construction remains essentially adversarial with continuing reliance on price competition and firm contractual arrangements (Saad et al 2002). In particular, the partnering concept has become 'hot' in construction. However, there is no unified view as to what partnering means, it being used in different ways and for different purposes. 'The concept captures a wide range of behaviour, attitudes, values, practices, tools and techniques' (Bresnen and Marshall 2000, p.231) and the literature offers a number of definitions. According to Egan (1998): 'Partnering involves two or more organizations working together to improve performance through agreeing mutual objectives, deriving a way of resolving any disputes and committing themselves to continuous improvement, measuring progress and sharing the gains' (p.12). Others also point out the 'long-term' characteristic of partnering (e.g. Saad et al 2002, CII 1991, NEDO 1991). Differences regarding views on partnering are numerous (Bresnen and Marshall 2000):

- Partnering is viewed as a process as well as an outcome.
- Some consider partnering to always be better than other ways of inter-organisational relationships, whereas others do not**.**

- Some view partnering as an informal and organic development, whereas others believe it to be formal and that it can be designed.
- Some believe that partnering always supersedes the role of the contracts, whereas others believe the contract is necessary in case of the breakdown of a partnering agreement.

In addition to disagreements as regards the meaning of partnering, the literature review reveals other weaknesses. It is pointed out that there is lack of theoretical frameworks underpinning the development of the new approaches (Cox and Townsend 1998) and that there is need for more systematic and in-depth research (Bresnen and Marshall 2000).

More specifically, there has been a strong focus on the contractor's relationship with their clients, less on the involvement of organisations such as specialist and trade subcontractors downstream in the process, even if 'The type of relationships a firm has with its customer has significant correlations with those it has with its suppliers (Saad et al 2002, p.179). It is also recognised that the client-focus (i.e. focus on the relationship only between the client and the contractor) in construction may have potential negative effects (Ivory 2005) because the client 'can and do act as significant barrier to innovation' because of the high risk involved in doing so (p.868). This is in accordance with Miller et al (2002): 'Whilst it is evident that the extent of contractor and subcontractor harmonization affects client/consultant satisfaction it is perhaps pertinent to note that the needs and objectives of the subcontractor is often overlooked' (p.80). This article discusses the importance of harmonization between main contractors and subcontractors as 'problems can arise when small firms are not fully integrated into the construction process resulting in unnecessary transaction costs for all involved.'(p.68). The authors conclude that '.. all parties should be construed as being vital to the construction process and that successful cooperation can only be achieved by establishing closer relationships between all contracted firms' (p.73) and '… future research should attempt to ascertain the extent to which all contractual parties can benefit from mutual cooperation within the construction process'. (p.80).

Supply chain management and partnering in construction

Besides of partnering, supply chain management (SCM) is another 'hot' topic in construction (see e.g. Akintoye et al 2000, Love et al 2004, Proverbs and Holt 2000, Vordijk et al 2000). This is in spite of the fact that the industry is considered to be different from other types of production, for example automobiles, from which SCM has developed (Vrijhoef and Koskela 2000, Ballard and Howell 2003, Winch 2003). Its popularity stems from much the same reasoning as for partnering because more outsourcing have made contractors increasingly reliant on other actors in the construction supply chain, e.g. suppliers and subcontractors (Vrijhoef and Koskela 2000). 'It was only with the emergence of project-specific partnering in the late 1980s that there appears to have been a significant move towards the more collaborative relationships and integrated processes associated with SCM' (Saad et al 2002, p.175). Questions of interest for the purpose of this paper include who are considered to be the partners in question and how do the partners relate to actors in other parts of the supply chain (or network). In the following, some views that we consider as important contributions to these questions is discussed.

According to Voordijk et al 2000, SCM means that independent firms agree upon the way in which production and information flows are organised. They divide supply chains in construction in three major subsystems: (1) Manufacturing of building materials and components focusing on increasing the efficiency in the manufacturing process; (2) Construction, i.e. the operating subsystem that directly produces the end-product and brings together many different kinds of work involving different technologies on the site; and (3) Design who is responsible for descriptions of appearance, layout functions of the building or engineering product, detailed drawings and specifications of every part. On behalf of the final customer, the designer determines the materials and commodities that will flow through the supply chain. The design work has to be co-ordinated with work within the construction and the manufacturing subsystems. According to their model, construction supply chains can have different dominant parties. Depending on whether the dominant party is the designer, the material supplier or the contractor, there are variations as regards building process, project organisation, and product market combinations as well as the core competence of the three specific chains and the relationships on which they focus. In a designer-

dominated supply chain, focus is on the relationship the client has to the designer as the client approaches the architect for planning and realisation of the project and authorises him to purchase materials and subcontract activities. In contractor-dominated supply chains, the focus is on the relationship between the client and the contractor as it is the contractor who does the building and runs the risk for the design phase as well as carrying out site operations and purchasing of materials and services. Finally, in supplier-dominated supply chains, the focus is on the relationship that manufacturers have with the client. Our conclusion is that this model takes into account that the focus varies from one project to another and that this has implications for the relationships that are taken into account. However, in all three situations also other actors will take part and be important, and thus the focal relationship will be linked to and dependent on also other relationships in and around that particular project.

Dainty et al (2001) claim that 'Despite the huge level of fragmentation within the industry, the role and influence of small and medium-size subcontractors and suppliers within partnering and strategic alliancing has largely been ignored (p.842).' They conclude that 'engendering the attitudinal change required for effective supply chain integration is unlikely to be possible without fundamentally rethinking the current inter-organizational relationships and dynamics that exist within the construction industry' (p.847). Further, while on the one hand the industry wants to implement SCM by establishing closer, more long term and stable relationships at an intra- as well as an inter-organizational level, they are more reluctant to reduce the number of suppliers and customers and place less focus on clearer negotiation of common objectives, open exchange of data and information and sharing of learning and innovation (Saad et al 2002,p.179). Our conclusion from this is that it seems that even if partnering is a goal, the actors involved do not want to comply with some of the most important prerequisites for obtaining close relationships! 'This may suggest a lack of clear understanding of the type of relationships associated with SCM' (ibid. p.180). One the one hand close, co-operative and long-term relationships is of interest, but on the other hand there are few strategic or primary partners. Finally, it seems there is a lack of understanding regarding the working of relationships, i.e. that it must be an agreement between both sides, not only the 'largest' partner, i.e. the contractor.

Ballard and Cuckow (2001) present a case study discussing aspects of logistics in the supply chains of two construction projects. They conclude that the overall pre-planning, i.e. in the design phase, does not take consequences of the choice of delivery channels for components and materials into account. It is the suppliers themselves, not their supply chains that are evaluated in the bidding process. Linked to this is little focus on supplier segmentation according to design input, service level requirements, physical characteristics and quantities, such as the number of vehicle deliveries. In one of their cases, they found that even if the developer and the contractor had been working together for more than 30 years, they had no formal partnering agreements. Interestingly the same developer (building supermarkets) had been the leader in developing partnerships with its suppliers in the retailing operations. In the same vein, Agapiou et al (1998) claim that 'very little consideration has been given to the role of builders' merchants in the supply chain' (p.351) and that 'the considerable loss and wastage of materials in the construction industry indicates that logistics can be described typically as *ad hoc* collaborations, lack of a long-term strategy and lack of an overall perspective (p.358).' Seldom are logistics activities of the production process taken into consideration, focus being on the lowest price. Hence, according to these authors, only the 'closest' suppliers are taken into account, resulting in a focus on one relationship in particular, namely the one between the client (or developer) and the contractor, i.e. the 1st tier supplier. And even for this relationship there is little degree of formalisation.

According to Wegelius-Lehtonen and Pahkala (1998), information and delivery processes are almost the same in every construction project even if products are different. And because the special end-product is assembled from several generic and specific components by the help of dozens of subcontractors, a partnering approach is needed when developing material delivery processes in the construction industry. Hence, even if it is implicitly, they point to the importance of the relations between the suppliers as well as the process leading to a particular output that goes in to a particular project. 'To develop processes it is essential to have close cooperation between all the actors in the process' (ibid. p.692).

Partnering in construction – identified gaps

First, even if the literature praises the importance of partnering, trust and close relationships, it seems that in this industry there is still a major focus on reduction and sharing of risks through contracts, mistrust among partners, and the belief that the more competition, the better. Hence, there is an inherent ambiguity or paradox in that even if the actors want (or say they want) partnering and close co-operation, they do not actually believe it to be realistic and thus they need to secure themselves through other means such as contracts and competition.

Second, the main focus in literature as well as the industry is on dyadic relationships, in particular on the client/contractor, but also to some extent on client/architect and contractor/subcontractor. Little attention has been given to these relationships connections to other relationships. An exception is the increasing attention the SCM construction literature gives to the importance of those that form the delivery processes feeding into the construction project. This includes producers and distributors of materials and components. However, compared to mainstream SCM, the applications in the construction literature gives little, if any, attention to the growing importance of third party logistics providers even if most components and materials are heavy and bulky and often require specialised transport and handling equipment. The main focus is on the 'traditional' actors in the construction processes – contractors, material and components producers, subcontractors and clients.

Finally, there are gaps in the literature with regards to what partnering and close relationships actually mean in construction concerning the means and degrees of integration and coordination between parties involved in the process, and the requirements to and implications of developing close relations. Accordingly, we conclude that even if the introduction of the SCM approach in construction has contributed with more understanding of the sequential connectedness of relationships, there is lack of understanding regarding the substance, i.e. dimensions and content, of these relationships as well as other types of relationship connectedness.

Relationship connectedness – an alternative angle

In the above section, we saw that partnering and SCM have gained much interest recently in the construction industry. However, there is a perceived need of a further understanding of the concepts of partnering and relationships in this specific setting. In current understandings of these concepts focus is put on dyadic and sequentially linked relationships. One of the key features of construction is complexity, which is related to the involvement of many different actors. Hence, there is a need for co-ordination between multiple units. In such a setting, focusing merely on the dyad or sequentially linked relationships seems insufficient.

Some studies have taken into account a broader perspective on partnering and co-ordination in construction, emphasising the importance of relationship connectedness and networks (e.g. Håkansson et al 1999, Dubois and Gadde 2000, 2002, Dorèe and Holmen 2004). These studies take as their starting point the IMP Group's network approach to industrial markets (see Ford 1990; Axelsson and Easton 1992; Håkansson and Snehota 1995). This approach views industrial markets as networks of inter-firm relationships. Through relationships companies become connected to each other and to a broader network of relationships. These connections create interdependencies that provide both possibilities and constraints to the involved actors. Compared to the SCM literature, the industrial network approach (INA) considers connections between relationships beyond the sequentially linked ones described in the earlier sections. As Gadde and Håkansson (2001) remarks, taking a network view means including actors and relationships that go in all directions, not only in chains.

INA holds that all companies have relationships. Relationships arise through continuous interaction processes whereby companies take part in exchange of products, information, money and social symbols with other companies (Håkansson 1982). As such business relationships contain technical, economical

and social dimensions. Within each of these dimensions, bonds may arise because of adaptations, creating interdependencies between the parties (Johanson and Mattson 1987). Adaptations are required as to provide efficiency in the exchange processes. Gadde and Håkansson (1994) suggest three main types of adaptations. First there are technical adaptations, which relate to the connection between the parties' production operations. An example of this is adaptations in the technical content or features of a product. Technical adaptation may also relate to the material flow between the parties, including the establishment of certain logistics systems. There may also be adaptations in the administrative routines between parties in a relationship. Information exchange is important in all relationships, and integration and adaptation are used to enhance the efficiency of this flow. Finally, some adaptations are related to the connections between the involved parties' knowledge bases. Over time relationship partners develop a considerable amount of knowledge about each other, represented in among others joint knowledge. This is important as it can enhance joint efforts in technical development (Dubois and Gadde 2000).

Håkansson and Snehota (1995) have developed a framework for how to understand the substance and effects of relationships and adaptations. The substance of a relationship may be described in terms of the activities, resources and actors involved, and how these are connected. The connections affect each of the parties, the dyad and the network of other relationships in which they are embedded (Håkansson and Snehota 1995). First, there are connections between the involved parties' activity structures, including the production, logistics, and administrative operations of the companies. Next, there are connections between the resource elements on both sides in the relationship, creating resource ties and possibilities for technological development. Finally, interaction between people creates actor bonds in the relationship, enhancing trust and commitment. It is important to notice that the strength and width of these connections vary among different relationships. The bonds and connections arise because of learning and adaptation, and provide continuity and relative stability to the relationship. The stability dimension of relationships may be seen as the very reason why relationships exist. Relationships become an important means for firms to handle the complexities and ambiguities they are facing in a market.

As we see, this network model pays particular attention to the notion of connectedness. Connectedness relates first of all to the notion that a relationship is a result of an interaction process where connections have been developed between two parties that produce a mutual orientation, commitment and interdependencies. As Håkansson and Snehota (1995) remark, the core in the "relationship" view of industrial markets is that over time the interaction process and the interdependencies created through this process produce something unique by interlocking activities and resources of the two involved parties. This uniqueness cannot be produced by either of the two parties alone or easily duplicated. The parties become embedded into each other. However, the notion of connectedness also relates to the recognition that relationships are connected.[1] One implication of this view is the understanding that stability and change is not merely a question of what happens in the dyadic relationship. These processes are both influenced by and influencing upon the total network of other relationships to which a relationship is connected. One issue that is highly relevant in this respect is related to the effects of adaptations in a relationship. Adaptations in one relationship may be beneficial for that particular relationship, providing efficiency and stability in the exchange processes. However, for the involved companies' other relationships these adaptations may not be very beneficial. Given this, relationships do not only provide possibilities, but also constraints.

Several authors within the IMP tradition have argued that business relationships differ in terms of how closely integrated the three layers of substance are. Gadde and Snehota (2000) argue that the differences between high-and low involvement relationships are reflected in the existence of strong activity links, resource ties and actor bonds, comprised by processes of co-ordination, adaptation and interaction. While low-involvement relationships require little of these three processes, high-involvement relationships imply close co-ordination of activities, adaptations in resources and frequent interaction between the involved actors, or in other words, learning. The integration and substance of a relationship has an economic aspect. As Dubois and Gadde (2000) remark, adaptations undertaken are investments that provide efficiency in day-to-day operations as well as possibilities for development. Adaptation effects make close

[1] Social exchange theory holds that "two exchange relations are connected to the degree that exchange in one relation is contingent upon exchange (or non exchange) in the other relation" (Cook and Emerson 1978). This view of connectedness has been widely adopted in the industrial network approach.

relationship important in themselves. However, just as important is that they provide links to other relationships, which can produce greater benefits beyond productivity. Industrial systems can be considered as networks of connected relationships. Buying companies today is not only encouraged to co-operate with suppliers, but also to facilitate co-operation between the suppliers as to gain network effects through the mutual adaptations made. As such the performance of the whole system can be enhanced. Despite the fact that adaptations in relationships may lead to beneficial network effects, there is an obvious problem. Adaptations create the kind of interdependencies companies often try to avoid and often require substantial investments (Dubois and Gadde 2000).

Given that close and high-involvement relationships are costly, it is highly recognised that a company cannot have such relationships only. Many have questioned the ”biased” view of promoting the establishment of close relationships, and pointed out that the benefits from such relationships must offset the investments made in developing and maintaining these resource-demanding arrangements. Following this notion is the argument of a need for variety among a company’s relationships, implying that close relationships are not appropriate in all situations (Araujo et al. 1999). Another important issue is that a relationship may in some periods need to be more closely integrated than in other periods. Hence, the degree and need of closeness in a relationship should be evaluated carefully on a continuous basis.

According to Dubois and Gadde, a main characteristic in the construction industry is arm’s length and short-term relationships. This is due to the strong focus on the project and its economy, providing competitive tendering. The construction industry may be seen as consisting of two networks. First, there is a permanent network, existing beyond particular projects and characterised by standardised products and routines. Second, there is a temporary project network, which is activated as to complete a building project, and characterised by substantial interdependencies and adaptations. As Dubois and Gadde remark (2002), adaptations in the construction industry are collective and project specific rather than relationship specific. While individual projects are characterised by tight couplings between actors, resources and activities, the permanent network is made up by loose couplings. The tight couplings in projects are possible because of the collective adaptations and the establishment of a community of practice in the construction industry (Dubois and Gadde 2002). However, long-term effects of these adaptations are as yet hard to gain benefits from, as the focus is on the project and relationships are confined to the duration of the single project.

Based on the above arguments, we suggest that the traditional view of partnering with an emphasis on dyadic relationships between clients and contractors is neither sufficient to understand partnering in the construction industry in general nor such relationships and how they work in particular. Rather an understanding of the importance of other relationships and the connections these provide is required. First, the supplier relationships that provide output that become the input to the contractor and thus the client (from SCM). Second, the connections between the contractor’s relationships with its different suppliers (from INA) are of great importance for the contractor’s relationship with its client. According to INA, other relationships pose both possibilities and constraints to a focal relationship. It seems reasonable to argue that because the partnership approach in construction is primarily confined to the relationship between clients and contractors in individual projects, the understandings of these effects are hampered. If we look at the traditional understanding and use of the partnering concept in the construction literature regarding the layers and the content of the relationships as identified in the INA literature review, the following findings are made:

- The focus is primarily on actors and to a certain, but very small degree on activities. Little attention is given to the use and combination of resources, and how this affects and is affected by relationship connectedness
- Little attention is given to the adaptation issue (except from Dubois and Gadde 2002), and the existence of social, technical or economical bonds. This is underlined by a focus on competition, contracts and short-term relationships.

Discussion – towards a framework

In this section we start by going briefly back to the empirical example presented in the beginning of the paper and sketch some of the connections between the relationships involved. This provides the first part of our suggested framework: the connections between the relationships in and around a project. Then we turn to the second part: the dimensions and substance of the relationships. Finally, we conclude and suggest avenues for further research.

Relationship connectedness

The example illustrates the complexity of relationships and their connectedness, and supports the view that the present body of literature within partnering in construction presents a (too) limited view of relationships in the construction industry. There is no way we can discuss this complexity in full in the present state of this paper. Rather, we want to point to some interesting aspects of this, which we will use as basis for further research by using the framework presented in the next section.

Focal relationships

Even if the literature focuses on the relationships from the standing point of the main contractor, and in particular, even if implicitly, it views the contractor's relationship with its client as the focal relationship in any construction project, our case suggests otherwise. In the construction of the new Bislett Stadium, there are many so-called focal relationships. Depending on whom you ask, they suggest different focal actors and relationships. For example, when asking Terramar, the project leader on behalf of the client, they focus on the relationship between the client (the Department of Culture and Athletics in Oslo Municipality) and the contractor (NCC). However, just as important from their point of view is the relationship between the client and the users (e.g. Bislett Alliance). Asking NCC, however, they focus on their relationships with suppliers, such as Spænncom and Siemens as well as the relationships with Terramar and Oslo Municipality. Furthermore, in the interview with the Department of Culture and Athletics, it is suggested that the central relationships in the early stages were with politicians, the architects from CF Møller, the building committee, the Bislett Alliance, as well as the neighbours. During the construction phase the most important connection was with Terramar and also to some extent the architects. Finally, the architect, C.F. Møller, emphasises that the relationships established before the actual building of the stadium were of severe importance. These include the relationships between C.F. Møller and the various actors stating the premises for the project, i.e. the client, the state antiquarian, the Building Committee and the users. In addition, the architect emphasises the relationships between these as well and other relationships to which these different actors were connected. For example the relationship between the client and politicians was crucial for the project to come true.

Given these different views, we see, as we have tried to depict with different colours in the figure below, that the Bislett example very well illustrates that there are a vast amount of actors and relationships that are involved in construction projects, and that, depending on who you ask, different pictures appear. In this respect, the traditional focus on dyadic relationships between clients and contractors seems fairly insufficient to both the understanding of such relationships and to the understanding of relationships and interaction processes in construction projects in general.

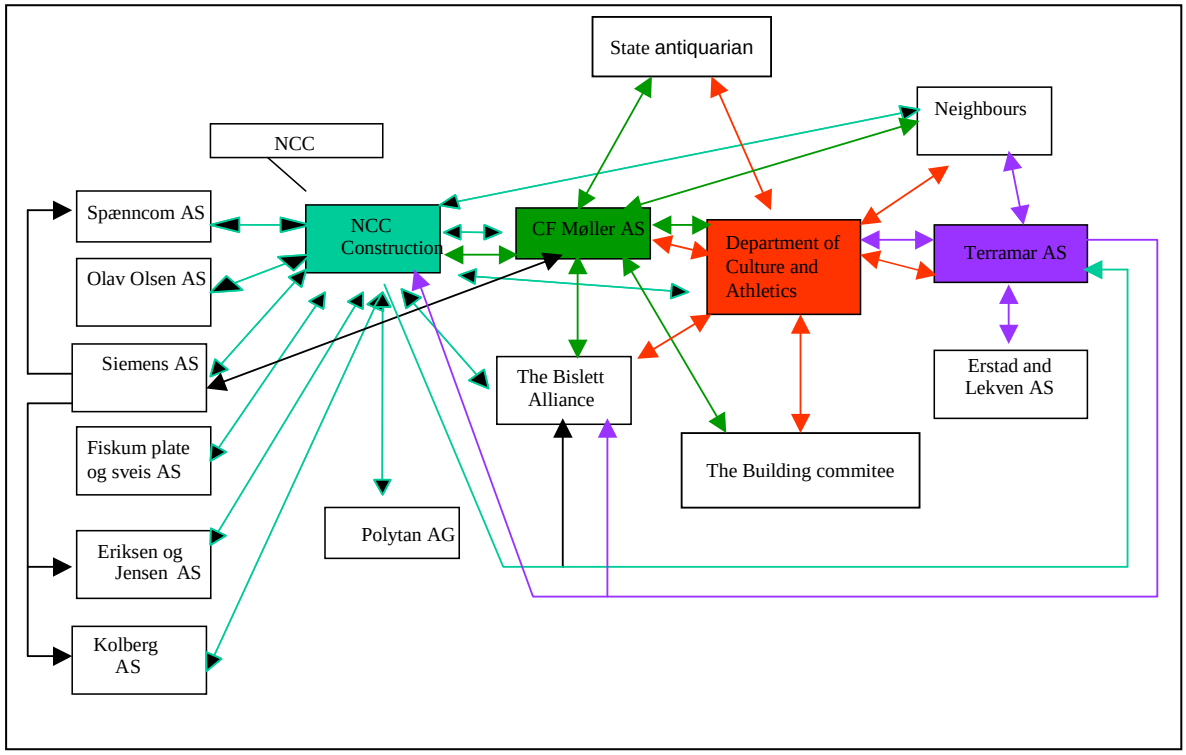

Figure 2. Identified focal actors and relationships (illustrated by different colours)

Sequential connections between relationships

The relationship between NCC and the client was very much dependent on the relationship NCC had to two of its major suppliers or sub-contractors. First, Spænncom, the supplier of the prefabricated tribune elements and other concrete components was of great importance for fulfilment of the strict deadlines. Second, Siemens as the supplier of the sound and lightening system, was of great importance for the fulfilment of the technical specifications and requirements from, not only the client (Oslo Municipality), but also the major users, e.g. the Bislett alliance and last, but not least the national television company (NRK) had set for these facilities.

Figure 3 below exemplifies how the focal relationship between NCC and the Department of culture and athletics is dependent on the relationships i.e. Spænncon has with its suppliers. Additionally, it shows how this focal relationship is dependent on Siemens connection with Spænncon, Eriksen og Jensen, and Kolberg when it comes to coordination on the construction site.

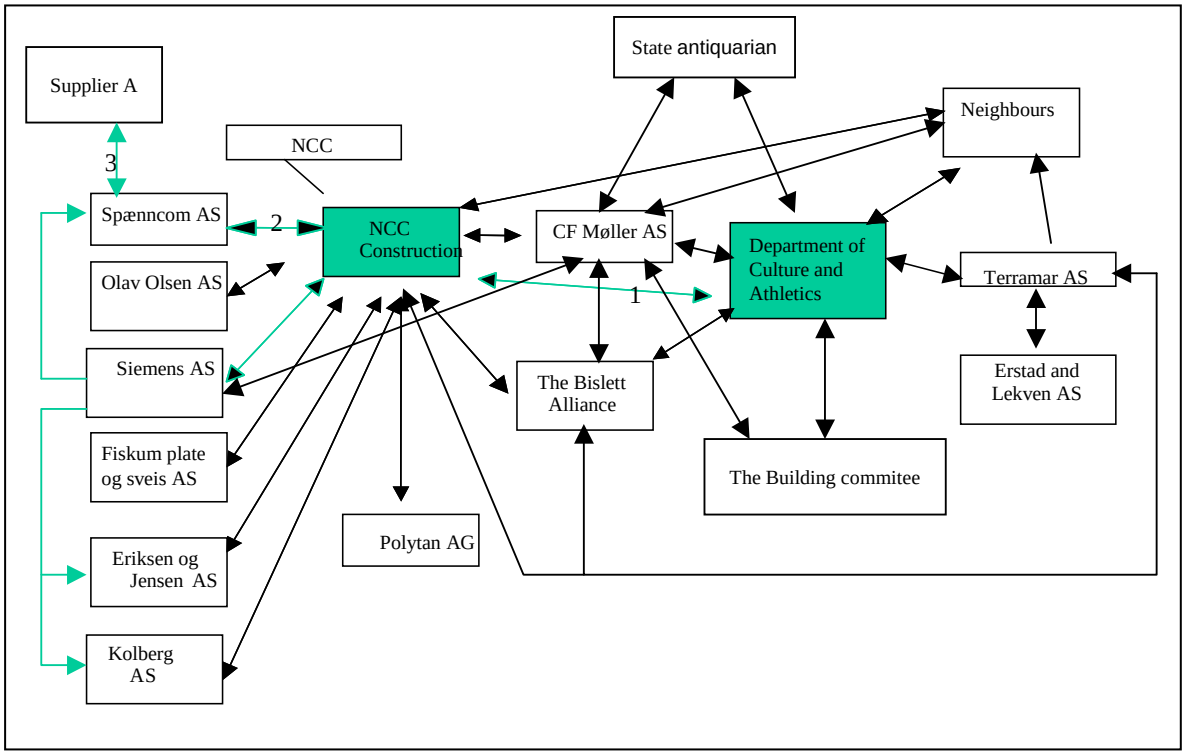

Figure 3.Focal relationship between NCC and Department of culture and athletics

Using traditional supply chain management (e.g. Lambert et al 1998) and seen from the client's perspective, NCC was the 1st tier supplier, whereas Siemens and Spænncom were 2nd tier and their material and component suppliers would be described as the 3rd tier. From a chain perspective, the overall offer, based on the specifications from client (including the architect) and users, is the basis on which NCC makes its overall project plan which are then divided into sub-plans for the different sub-contractors/suppliers. In this example the main suppliers had sub-contractor roles implying that not only were they to deliver components and materials, but their job was also to design their parts as well as taking care of the assembly work itself. Such contracts also include that the sub-contractors take care of purchasing and ordering from their suppliers. The chain perspective is based on a logic where the plans provide the necessary specifications for the components to be produced, first at the sub-suppliers, providing the necessary components, input for the next step (i.e. here the sub-contractors) in the chain in a sequential process. In this example we see that consultants, architects, and various stakeholders feed inputs into the project, in terms of suggestions and requirements, and these inputs are together with the physical inputs (i.e. components) used by the contractor and the sub-suppliers to create an output (i.e. the Bislett stadium), which is further used (e.g. by the athletes and media).

In the case of Bislett, however, (as in many other construction projects), the planning of sub-components, e.g. sound and lightening, takes place also during the erection of the building, due to time constrains, but also because changes had to take place during the process. One example is that the original plan was to have 10 lightening masts (consisting of a 'pole' in three parts, about 30 floodlights and a traverse on which the floodlights are fastened) delivered and assembled by Siemens. However, due to an extra roof that was added, only 9 masts were set up. Accordingly, changes in plans had to be made which illustrates the difficulty of relating only to sequential connections between relationships based on a typical output-input-output thinking. In all, Siemens, for example, had to manage thousands of different components just for their deliveries. Together with tough deadlines and a relatively complex construction, much co-ordination for evaluating and re-evaluating plans with regards to changes had to take place at the site during the

process, which again had consequences for the relationships and processes also with those involved in upstream in the flow, and who were not physically at the site. Hence, the Bislett example illuminates that there are other actors and relationships involved in construction projects beyond those that would be considered in the traditional SCM literature with its focus on sequential linkages.

Other connections between relationships

The interviews so far have identified a number of indirect and other connections between relationships in this particular project in addition to the sequential ones from a supply chain point of view. First, relationships are indirectly connected during the project. The connection between NCC's relationships with the various consultants may illustrate this point. NCC had relationships with the architect, C.F Møller, and other consultants such as, Olav Olsen AS on concrete. These parties met regularly, where the different solutions were discussed. It is likely to expect that these actors and relationships affected each other, and that what was decided in the relationship between NCC and the consultants from Olav Olsen AS affected upon the relationship between NCC and the architect and vice versa. Furthermore, it is likely that the relationships that evolved during the technical discussions between NCC's various sub-suppliers, such as between Siemens and Spænncom, affected upon the relationships NCC had with each of them.

Second, there are relationships from the past that play an important role for the present. C.F. Møller's relationships with the client and the various stakeholders were very important to NCC and the relationship between NCC and C.F. Møller. The latter had knowledge about the process 10 years back in time and a great knowledge about the various preferences and requirements. This helped NCC, as they did not have these experiences on their own. However, it also resulted in major discussions between the two parties. When NCC wanted to make a change, C.F. Møller would often refer to decisions made in the past and explain why the changes could not be done. Before the Bislett project, some of the involved actors had worked together in earlier projects, while others were completely new. For example, the project manager from Terramar and the construction manager from Erstad and Lekven, had worked closely for several years. In addition, NCC had also worked with Siemens earlier, though not the specific persons involved in the Bislett project. It also turned out that NCC in Denmark had Spænncom, the tribune supplier, as a preferred partner. However, this was not known by NCC Norway, when they chose Spænncom for the Bislett project.

Third, relationships formed during the project are important for future relationships. After the Bislett project, many of the actors recognise that the good relationships that were established, influenced the project positively. As the architect, C.F. Møller, remarks, its relationship with NCC, characterised by good communication and personal chemistry aided the co-ordination. Though the parties have not made any agreement about future projects, the architect believes that it would have been beneficial to work together again as the parties now know each other so well. The same goes for the relationship between NCC and Siemens who together developed particular competence in the construction of stadiums. Also the relationship between NCC and Spænncom worked in such a way that it is, according to our interviewees would be interesting to continue to work together also in the future. This is related to what Dubois and Gadde (2002) term the temporary network on the one hand, and the stable network on the other.

Dimensions and substance of relationships

If we look at the different relationships identified above, how may these be described in terms of the different layers (i.e. actors, activities and resources) and the dimensions (i.e. the social, technical and economic) of relationships derived from the INA perspective? It is not difficult to identify the occurrence of the different layers in the relationships involved in the Bislett project. We have already looked at connections between the various actors. However, the co-ordination of these actors' activities and resources were the very essence of why these relationships existed and the main means through which the building of the Bislett stadium was carried out. For example, according to one of the interviewees, there were on average 200-300 people on the construction site simultaneously, working with putting the physical input resources together. This required a substantial co-ordination and adaptation process of the

activities. In addition, the resources themselves also had to be adapted. Any changes in some of the resource elements had to fit with the other resource elements. One incident in the project illustrating this point is when a mistake was discovered in the drawings of the elevator. Before this could be changed back again, the architect had to check out if the foundation of the elevator had been built. These resources had to match in order to work. The co-ordination of the physical resources further required a co-ordination of the human resources involved. Those responsible had to learn how to use and combine the physical resources.

If we look at the dimensions of the relationships, we see that the above example illustrates well the existence of the technical interdependencies that existed in the project. The various resource elements had to fit together, and this required both co-ordination and adaptations. There were also substantial economic interdependencies involved in the project, and subsequent economic bonds between various parties. One of the main characteristics of this project was the scarcity of economic resources. According to the architect this influenced a lot on the project. It also influenced the relationship between the client and the contractor, as everyone knew that there was not more money to use. Hence, some compromises had to be made in terms of what the contractor wanted to offer and what the client and the architect wanted. When it concerns the last dimension, the social one, we noticed earlier that several of the involved parties have emphasised that the climate and communication were good in the project. In addition, some of the people had worked together earlier and hence had developed personal relationships. It is hence evident that social bonds were established in the Bislett project, which presumably had positive effects on the project. The fact that the project's contract regime was not based on so called 'relationship-contracts' where the 'partnering' the partners agree to do, is formalised and described in the contract, did not seem to play any particular important role. Or rather, it has not been mentioned by any of the actors that lack of such contracts was a problem for the cooperation that took place. This might suggest, that, contrary to what is the present focus in the industry, the contract is not so important in order to have good interaction and cooperation. Linking back to the discussion around different views on partnering in construction in section 3.0, it seems that Bislett is more an informal and organic developing type of partnering than the formal, designed type, much in accordance with the general view in the industrial network approach.

Conclusions and further research

INA provides a tool for identifying all actors and relationships in construction by focusing on networks and relationships connectedness. This is in accordance to the purpose of this paper and has been illustrated by use of examples from our case. One potential managerial implication that could be drawn from our discussion is that the complexity of relationships and partners involved show that there is no way everyone can be included in the project from the beginning, even if everyone would like to take part from the start to be able to influence. Furthermore, INA provides possibilities for investigating relationships in construction more thoroughly, by various relationship characteristics, such as the three layers and the dimensions. One important implication is that there is no way a contract can 'solve' the challenges of cooperation, even if contracts are important. This contradicts to what is often focused in the traditional literature and by many practitioners relating to partnering. In summary, INA allows us not only to identify what kinds of actors and relationships that are involved in construction projects, but also to describe these relationships. The framework could, apart from describing relationship connectedness, i.e. construction networks and the substance of the relationships, be used to:

- Identify where to put efforts into developing closer relationships?
- Develop tools and models for improved interaction?
- Develop understanding of economic logics?
- Develop understanding of how to link activities and tie resources?
- Develop understanding of project management and the widening of this approach?

- Develop understanding of what constrains and facilitate relationships?
- Develop understanding of how to identify and activate the total resource base available?

So far, we have only begun to 'scratch' the surface of the complexity and the many interesting and challenging issues in the construction industry when it concerns partnering and interaction. A more in-depth case study of the Bislett project is what we would like to do, using the framework as suggested here and develop it further. In particular we would like to follow the consequences for the actors and their relationships from the Bislett project to other similar projects. Accordingly, we are interested in relationship connectedness, not only within projects, but also between them – in time and space. One main research issue for which the framework can be used for further research, is the study of relations between projects, i.e. increase the understanding of how different logics within the industry is connected, e.g. projects and supply chains and their relations to the network as discussed by Håkansson and Jahre (2005).

Gadde and Håkansson (1994) notice that the focus on closer relationships with suppliers has had several implications for purchasing. One of the main implications is that purchasing strategy has become an issue for top management. It also implies that there is a switching focus towards decentralisation of purchasing activities rather than the centralised purchasing departments. This is an important question in the construction industry because many of the larger actors are striving towards more centralised purchasing, i.e. away from personalised, regionalised decisions, towards national, even Nordic based purchasing agreements and decisions. This ambiguity presents an interesting challenge for future research.

According to Gadde and Håkansson (2001), there is a risk in overemphasizing the chain aspect (p.171). They argue that there are good reasons to include other branches in the network (that go out in other directions) in the analysis as well. "If the chain is focused on in isolation, the companies may again start to build the kind of integrated company that was one so popular". The concept of network thinking captures these thoughts. Thinking and acting based on a network view provide possibilities for activating all actors and relationships, constituted by various activities and resources, and hence facilitation of productivity and innovativeness. This last point leads to another interesting and important issue in construction. Much research and managerial solutions in construction today focus on how to become lower costs and mistakes and become more productive and efficient through use of centralisation, standardisation and partnering. What we would suggest are studies where also the backside of these trends are discussed, in particular with regards to their implications for innovativeness in the construction industry, with regards to developing new technology, but even more with regards to developing new processes that take into account also the need for becoming more innovative.

References

Agapiou, A, Flanagan, R, Norman, G and Notman, D (1998) The changing role of builders merchants in the construction supply chain, *Construction Management and Economics*, 16, 351-361.

Akintoye, A, McIntosh, G and Fitzgerald, E (2000) A survey of supply chain collaboration and management in the UK construction industry, *European Journal of Purchasing and Supply Management*, 6, 159-168.

Araujo, L. Dubois, A. and Gadde, L-E. (1999) Managing interfaces with suppliers, *Industrial Marketing Management*, 28 (5), 497-506.

Axelsson, B. and Easton, G. (1992) *Industrial Networks: A New View of Reality*. Routledge, London.

Ballard, G and Howell G A (2003) Lean project management, *Building Research & Information*, 31(2), 119-133.

Ballard, R and Cuckow, H. J (2001) Logistics in the UK Construction Industry, *Logistics & Transport Focus,* Apr 2 001, Vol. 3 Issue 3, p43-50.

Bresnen, M and Marshall, N (2000) Partnering in construction: a critical review of issues, problems and dilemmas, *Construction Management and Economics*, 18, 229-237.

CII (1991) *In search of partnering Excellence*, CII Special Publication, Construction Industry Institute, Austin, TX.

Constantino, N, Pietroforte, R and Hamill, P (2001) Subcontracting in commercial and residential construction: an empirical investigation, *Construction Management and Economics*, 19, 439-447.

Cox, A. and Townsend, M. (1998) *Strategic Procurement in Construction; Towards Better Practice in the Management of Construction Supply Chains*, Thomas Telford Publishing.

Dainty, A R J, Briscoe, GH and Millett, SJ (2001) Subcontractor perspectives on supply chain alliances, *Construction Management and Economics*, 19, 841-848.

Dorèe, A. G. and E. Holmen (2004) Achieving the unlikely: innovating in the loosely coupled construction system, *Construction Management and Economics,* 22, 827-838.

Dubois, A. and L. E. Gadde (2000) Supply strategy and network effects - purchasing behaviour in the construction industry, *European Journal of Purchasing & Supply Chain Management,* 6, 207-215.

Dubois, A. and L. E. Gadde (2002) The construction industry as a loosely coupled system: implications for productivity and innovation, *Construction Management and Economics,* 20, 621-631.

Egan, J.S. (1998) *Rethinking Construction*, Department of the Environment, Transport and the Regions, London.

Ford, D.,(ed.) (1990) *Understanding Business Markets. Interaction, Relationships, Networks*. Academy Press London.

Gadde, L-E. and Håkansson, H. (1994) The Changing Role of Purchasing: Reconsidering Three Strategic Issues, In Ford, ed. (2003) *Understanding Business Marketing and Purchasing*, 3rd ed. Thompson, London

Gadde, L-E. and Håkansson, H. (2001) *Supply Network Strategies*, Wiley, Chichester

Gadde, L-E. and Snehota, I. (2000) Making the most of supplier relationships, *Industrial Marketing Management*, Jul2000, Vol. 29 Issue 4, p305.

Håkansson, H. and Jahre, M. (2005) Economic Logics in the Construction Industry, *ARCOM-proceedings*, London, September.

Håkansson, H. and Snehota, I. (1995) *Developing Relationships in Business Networks*. Routledge, London.

Håkansson, H., Ed. (1982) *International Marketing and Purchasing of Industrial Goods: An Interaction Approach.* Wiley, Chichester.

Håkansson, H., Havila, V. and Pedersen, A-C. (1999) Learning in Networks, *Industrial Marketing Management*, 28(5), 443-452.

Humphreys, P, Matthews, J and Kumaraswany, M (2003) Pre-construction project partnering: from adversarial to collaborative relationships, *Supply Chain Management: An International Journal*, 8(2), 166-178.

Ivory, C. (2005) The cult of customer responsiveness: is design innovation the price of a client-focused construction industry? *Construction Management and Economics*, 23, 861-870.

Johanson, J. and L.-G. Mattson (1987) Interorganizational Relations in Industrial Systems: A Network Approach Compared with the Transaction-Cost Approach, *Int. Studies of Mgt. & Org.* XVII(1), 34-48.

Love, P E D , Irani, Z and Edwards, D J (2004) A seamless supply chain management model for construction, *Supply Chain Management: An International Journal*, 9(1), 43-56.

Miller, C.J.M., Packham, G.A. and Thomas, B.C. (2002) Harmonization between main contractors and subcontractors: A prerequisite for lean construction? *Journal of Construction Research*, 3(1), 67-82.

NEDO (1991) *Partnering: Contracting without Conflict*, HMSO, London.

Proverbs, D G. and Holt, G D (2000) Reducing construction costs: European best practice supply chain implications, *European Journal of Purchasing and Supply Management*, 6(Special Issue), 149-158.

Saad, M., Jones, M. and James, P. (2002) A review of the progress towards the adoption of supply chain management (SCM) relationships in construction, *European Journal of Purchasing and Supply Management.* 8, 173-183.

Swärd, A.R.S. (2006) *NOTAT Samspill i Nettverk,* Results from a pilot study.

Voordijk, H, de Haan, J and Joosten, G-J (2000) Changing governance of supply chains in the building industry: a multiple case study, *European Journal of Purchasing and Supply Management*, 6(Special Issue), 217-225.

Vrijhoef, R and Koskela, L (2000) The four roles of supply chain management in construction, *European Journal of Purchasing and Supply Management*, 6(Special Issue), 169-178.

Wegelius-Lehtonen, T. and Phakala, S. (1998) Developing material delivery processes in cooperation: An application example of the construction industry, *International Journal of Production Economics*, 56-57, 689-698.

Winch, G M (2001) Governing the project process: a conceptual framework, *Construction Management and Economics*, 19, 799-808.

Winch, G M (2003) Models of manufacturing and the construction process: the genesis of re-engineering construction, *Building Research & Information*, 31(2), 107-118.

Interviews for the case study:

S. Movold	Project manager	NCC Anlegg	061205
S. Movold			140206
E. Svendsen	Business development	Terramar AS	240106
E. Ræstad	Assistant project manager	Terramar AS	240106
S. Helgesen	Department leader	Kultur og Idrettsetaten	060306
L. Iversen	Department leader	Siemens Installasjon	080306
K. Aakhus	Architect	CF Møller Norge AS	100306