WHEN CONSTRUCTION PROJECTS ARE TO SATISFY HEALTH CARE NEEDS – PARTNERING AS A WAY OF CONNECTING THE TWO?

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Abstract
In the construction industry the intention with partnering is that it should facilitate closer interaction between the client and the project organisation and particularly assist the contractor-client communication. In the Scandinavian countries, a number of high-technology hospitals are currently being planned for and being built through partnering agreements with intentions of providing modern health care supported by advanced medical technology. Health care represents a complex structure of actors, resources and activities that are to be coordinated toward the purpose of providing relevant and consistent care services to individuals over time. The remaining project organisation embodies construction-related organisations that represent a temporarily organised constellation of actors, resources and activities in the design, production and delivery of the building. Thus, as construction "meets" health care in a construction project, there are very different requirements that are to be fulfilled; that of gaining benefits from temporarily organising around a construction project and that of having a facility that supports complex care processes over time. The differences in requirements in turn rests on the different logics of on the one hand temporary and on the other hand permanent organisations of a different set of activities, resources and actors. Through the industrial network approach (INA) we outline the interactions taking place between key actors in a large health care construction project practicing partnering in Sweden, and investigate how partnering affects the communication of these different logics in play. How is the interaction coloured by these different requirements and logics during the different project phases, and what is the role of partnering in creating a favourable setting for useful interaction?

Keywords: partnering, construction, project, health care, interaction, interface, relationship

INTRODUCTION

In the construction industry, project *partnering* has been introduced as a form for client-contractor collaboration with the aim of establishing effective communication, mutual trust, long-term commitment, coordination and creativity (Cheng, et al., 2000). In the long run this is meant to enhance the productivity of the industry and the quality of its products – the constructed assets (e.g. Alderman & Ivory, 2007; Bresnen et al., 2003; Bygballe et al., 2010). Basic premises of constructed assets is that they should support the business processes, i.e. activities, of its users (Winch, 2010). Thus, if partnering is meant to enhance the quality of constructed assets, it should also be a means of improving the design quality of these assets, i.e. their ability to support user activities. Put differently, when functioning properly, project partnering should result in buildings with an increased 'usability', defined as the functionality of the building from the view of its users (Fronczek-Munter et al., 2016).

Hospitals are an example of buildings that need to fulfil a number of different demands in supporting the health and well-being of individuals and societies. The health care provided via hospitals represents a complex structure of actors, activities and resources that is coordinated for the purpose of providing effective and efficient care services to individuals (Gittell & Weiss, 2004). Users of a hospital are defined as patients, the different health professions, non-medical staff and other stakeholders, such as facility management (Pheng & Rui, 2016). From the individual patient's perspective and a systemic efficiency perspective, the hospitals' value for its users is not only based on the resources *within* the specific hospital building, but on the *coordination* between different care providers. This coordination is central in order to secure even the most basic functions of healthcare, such as patient safety and treatment quality (Peikes et al., 2009; Kripalani et al., 2007; Ehrlich et al., 2009; Ferlie & Shortell, 2001; Ferlie & McGivern, 2003). Another pivotal concern is that healthcare processes are always dependent on systemic regulations and local policy. Moreover, in order to achieve high quality in any healthcare systems' processes, there has to be a certain level of consistency between these levels (Ferlie & Shortell, 2001). This implies that when constructing effective health care facilities a complexity of relationships, of which those facilities is to become an integrated part, needs to be taken into consideration.

Partnering is applied in complex projects, such as hospitals constructions which here are viewed as complex engineered systems (Barlow & Köberle-Gaiser, 2009).The purpose of partnering is risk sharing among the project actors, reducing overall costs and achieving increased quality of the final building. However, reaping the intended benefits of partnering has proved challenging. It requires commitment by the project actors to change traditional work practices (Bygballe & Swärd, 2019) and the outcome of the temporary collaboration is circumstantial; it depends on the specific combination of partners, tools, methods and practices which makes it difficult to develop into *"a universally applicable model"* (Bresnen, 2010, p. 625). With the purpose of exploring the role of partnering as a collaborative approach for delivering functional and high-quality buildings, we formulate the following research question: *how is the outcome of partnering, in terms of the resulting building, related to the specific actors of the project and their relationships over time?*

The remainder of the paper is organised as follows. First, a literature overview of partnering as a collaborative approach in construction projects is outlined. Second, we outline the IMP perspective on inter-organisational collaboration in which interaction across time and space are two central dimensions. We then present a case study of a partnering project for the construction of a unique cancer treatment facility in the Nordic countries - a new proton radiation clinic built in Uppsala during 2011-2015 called the Skandion Clinic (Crespin-Mazet et al., 2015; Havenvid

et al., 2016). In the final discussion, we analyse the case based on how the implementation of partnering relates to a complexity of relationships across time and space related to both the construction- and health care-related organisations.

LITERATURE

Partnering in construction

In the construction sector, the main production activities are performed in temporary projects. Consequently, construction projects consist of temporary coalitions of different actors relying on the coordination of activities and resource bases across organizational boundaries (Winch 1998). Construction is characterized as a highly fragmented industry involving many actors with "only partly overlapping interests" within the realms of temporary projects (Bygballe & Svärd, 2019, p. 1). Competitive tendering is the most common tradition of procuring services and materials, resulting in the selection of suppliers and sub-contractors being based on lowest price (Bygballe et al., 2010). Due to this organisational fragmentation and traditional tendering procedures there is a general lack of integration among construction actors, and relationships among construction actors are described as both adversarial and short- term (Dainty et al., 2010; Dubois & Gadde, 2002a). As a new practice, *partnering* has been introduced as a way to initiate closer and more long-term relationships among construction actors (Alderman & Ivory, 2007 Bresnen & Marshall, 2000; Crespin-Mazet & Ghauri, 2007; Gadde & Dubois, 2010; Hong, et al., 2012). In contrast to a competitive or adversarial approach, partnering is a way of *sharing* risk, costs and benefits with other actors. There are two forms of formal partnering: project partnering, which is formal agreement usually between the client and the main contractor of how to share the risks, costs and benefits of an individual project, and strategic partnering, which is a formal long-term agreement of the same across several projects. Strategic partnering is rarer than project partnering. This has also spawned a great deal of studies on partnering as an empirical and theoretical phenomenon but still it "remains an elusive concept" within the construction management literature (Bygballe & Svärd, 2019, p.1). However there is an increased interest in investigating the dynamics of partnering and how it unfolds as a result of interaction processes among various project actors (Bygballe & Svärd, 2019; Bresnan & Marshall, 2002). At its best, partnering is seen as contributing to effective communication, mutual trust, long-term commitment, coordination and creativity among project actors (Cheng, et al., 2000; Jacobsson & Roth 2014), which in turn can lead to increased productivity and quality, reduced transaction costs and improved customer satisfaction (Bresnen & Marshall, 2000; Bygballe & Svärd, 2019). However, whether or not these benefits are achieved is circumstantial as it requires commitment by the project actors (Bresnen, 2010). It requires new ways of thinking and operating in relation to other actors and calls for new work practices (Bygballe & Svärd, 2019).

Several studies of partnering indicate that project success is related to the earlier experiences of a specific partner. For instance, the development of mutual knowledge between client and contractor over several projects assists in joint decision-making (Eriksson & Nilsson, 2008), in developing the partnering relationship as such (Crespin-Mazet et al., 2015), and in developing continued partnerships (Castro et al., 2009). In a project, the agreement of using partnering is mainly decided by the client and the contractor, alternatively it is stated already in the invitation for tender by the client. Much literature focuses on the client-contractor relationship and how this is affected by the partnering approach. However, it has also been shown that implementing such a collaborative approach between client and contractor has network effects in terms of actualising the need to include others in the cooperation, such as subcontractors and end-users (Crespin-Mazet et al., 2015; Eriksson 2015). Thus, when a collaborative approach is initiated between

client and contractor, the need and possibilities of including other parts of the actor network is accentuated. Therefore, potentially, partnering as a way of relating and collaborating may open up possibilities for directly and indirectly including several actors and perspectives within and across projects (Eriksson, 2010; Eriksson, 2015). In investigating the integration of various actors in partnering projects, Eriksson (2015) identifies four dimensions of integration among various actors in the supply chain; *strength* (the number of activities integrated among the actors), *scope* (which actors in the supply chain are involved), *duration* (timing and duration of the actors being engaged and the duration of relationships across projects) and *depth* (which individuals and functions of the project actors are involved). According to Eriksson (2015), project owners need to be aware of these four dimensions when entering partnering projects as they are of strategic importance for the project outcome. We now turn to our analytical framework for analyzing the case; the significance of interaction through space and time.

The IMP perspective - interaction across time and space

The IMP perspective enables scrutinization of inter-organizational collaboration and interaction. Interaction is essential as no firm can possess all necessary resources and activities for its business in-house, and it is through interaction firms get access to resources and can relate to activities of other firms (Gadde et al., 2003, Håkansson et al., 2009). Therefore, interaction is in itself a central activity for firms and the connections established in the form of relationships among firms are important resources (Håkansson, 1982). The relationships with other firms are thus important as they provide access to other firms' resources and also, they provide a connection to other relationships and other firms. Consequently, from the IMP perspective, firms as business actors are embedded in intricate networks consisting of multitudes of interactions and relationships, forming networks characterized by interdependencies established in the connections of actors, resources and activities (Håkansson and Snehota, 1995).

Through interaction two firms are not only connected with each other but joined together with other actor constellations as interaction takes place in numerous *interfaces in space*, relating and connecting various actors, their activities and resources to each other. Handling these interfaces is crucial as an actor affects and are affected by other actors where interfaces exist. The interfaces create the arena where value and development are generated depending on how the interfaces are dealt with (Håkansson et al., 2009). Some interfaces are direct and others are indirect depending on the perspective in the ongoing interaction. For instance, in relation to the outcome of a construction project, some interfaces are direct as they provide focal connections with heavy content crucial for the project. At the same time, the focal direct interfaces are dependent on numerous other indirect interfaces, due to the many existing interdependencies stretching over space, within the project and outside the project boundary. Thus, interfaces are interconnected, as events or changes in one interface affect other interfaces, both direct and indirect.

Interaction in itself has a certain substance and affects the resources that are involved, and the activities that are performed, bringing about change and transformation over time (Håkansson et al., 2009). Thus, the content of interaction develops over time. Interaction in *interfaces over time* refers to how the connecting of actors, and their resources and activities, changes over time based on what happens in the interfaces. At a specific point in time, for instance, in a construction project, the actors involved in interaction are concerned with particular issues in relation to the project, with a certain logic involving specific actors dealing with particular aspects in a certain context. However, what takes place within this certain episode of interaction, for instance, within the frame of a construction project, is affected by interaction in previous episodes and also, expectations regarding the future. For the individual construction

project, the connectedness among projects over time implies that how the experience gained in one project is brought to the next project is crucial. In relation to project partnering as described in the previous section, this implies that the effects of implementing partnering in any specific project must be understood as part of a wider organizational and temporal context. This implies that an interface analysis must be based on a framework that goes beyond the project context. Therefore, in this paper interfaces and their content and function, i.e. the involved actors and how they and their activities and resources are connected, are thus investigated both in space and time, within and across project boundaries.

METHOD

The investigation is based on a case study approach, which is appropriate when studying the relation between a phenomenon and its context (Dubois & Gadde, 2002b). In this case the phenomena is the effects of project partnering in the context of constructing an effective health care facility satisfying a complexity of health care needs over time. The case was selected due to its special nature of representing a first partnering agreement between the client and the contractor and being a unique health care facility in the Nordic countries requiring specialized solutions related to a specific health care context. The expectations on the role that partnering needed to play in this project were thus high and specific. Health care was selected as the project context as it represents not only the complex type of project that is considered suitable for partnering but even an 'extreme' example of complexity, which should be helpful in revealing both the benefits and challenges of using partnering for the sake of delivering high-quality buildings. Data was collected through semi-structured interviews (Hesse-Biber & Leavy, 2011) with various firms and organizations of the project organization. The organizations included were the client/developer, main contractor, the tenant/user organization, several subcontractors, the architect, the planning coordinator and the med-tech supplier. The interview guide was based on a resource perspective on inter- organizational collaboration in tracing the use and development of material and immaterial resources across firm boundaries within and beyond the boundaries of the specific project – across time and space. The interviews also aimed at capturing the different perspectives of the actors on collaboration and the specialized solutions developed during the project. In total, 20 face-to-face interviews with key individuals were performed between 2012 and 2013, lasting an average of 1 to 1.5 h. The interviews were recorded and transcribed accordingly. Additional data was collected between 2018 and 2019 through secondary sources such as firm documents and newspaper articles reporting on various outcomes of and perspectives on the finished facility. This complemented the interviews, which were performed during the actual project, in terms of "what happened next". The resulting data material was analyzed in two steps. First a 1st order type of analysis was performed through which certain patterns and themes related to interaction across time and space were identified across the material, such as the significance of relationship history between specific actors (see also Crespin-Mazet et al., 2015). Then a 2nd order type of analysis was done where we looked for underlying reasons for why these patterns across time and space emerged, such as why certain actors had more or less influence of the specifications of the building or why the inter-organizational communication in the project was affected in particular ways. This provided us with a deeper understanding of what role partnering both could and could not play in the delivery of a unique health care facility.

THE CASE

Introducing the Skandion clinic

The Skandion clinic - located in Uppsala, Sweden - is the first cancer treatment clinic based on *proton radiation therapy,* in Scandinavia. It provides a type of radiation causing less damage to

surrounding tissue and is thus a preferred therapy for children and adolescents. Skandion started as an initiative from Sweden's seven university hospitals and their respective county councils in 2002, instigated with the main aim to establish and run a cancer clinic, located in Uppsala. The collaboration manifested in a new organization called *Kommunalförbundet Avancerad Strålbehandling (*KAS), which was established in 2006. The business model departed from the notion that all 21 county councils payed an annual membership fee along with a fee of each individual treatment (referred to as "fractions"). The in-flow of patients depended on a procedure where patients were being remitted by local hospitals to university hospitals and finally enrolled to the Skandion clinic. The treatment of patients would thus depend on collaborations across the seven country councils through joint decision-making between oncologists at the university hospitals, a procedure referred to as "distributed competence".

The Skandion construction project - high-tech solutions and partnering

In 2009, KAS signed a contract with a Belgian firm, *IBA*, an international firm specialized in developing and selling cyclotrons for cancer treatment. At the time, they had delivered cyclotrons to around 25 proton clinics world-wide. The equipment cost was around 50 million Euros and the equipment was highly advanced as well as extremely heavy weighing about 200 tons. In 2010, KAS issued a call for tender with the intention of allocating a developer that would subsequently act property owner of the building, and KAS would become a tenant. *Akademiska Hus* (AH), a Swedish developer and property owner specialised in higher education buildings won the bid with a tender involving a partnering collaboration with *NCC Construction*, a large construction company with local facilities in Uppsala. Although AH and NCC had more than 20 years of working together on various projects, this was the first formal partnering agreement between them. AH engaged in partnering with NCC due to the specific challenges of constructing the Skandion clinic. Firstly, healthcare facilities were a new area for AH whereas NCC had previous experience of healthcare buildings. Secondly, it involved high risks (new type of high-tech treatment, radiation safety) which AH could now share with NCC.

Representing the end-users – the involvement and requirements of KAS

KAS was responsible for planning and preparing for the future healthcare processes taking place within the building. These plans would act as a roadmap for the design and planning organization (consisting of Sweco as a planning coordinator, the architect, and technical consultants/advisers representing ventilation, electricity, safety, plumbing etc.) At this point in time, on an operational basis KAS consisted of two people: the manager/director and a chief physicist. Also, a medical board, consisting of oncologists and hospital physicists from the seven counties, was involved. The planning coordinator at Sweco reflects on KAS being a "weak" counterpart in deciding on the design by saying: "[KAS was immature] resulting in weak and little feed-back and in-put on information that we are dependent on to continue... especially the architect had a tough journey. He had no counterpart to talk with. There was only a reference group consisting of county councils that represented KAS." The point of departure for the requirements communicated by KAS reflected their main interest of creating an efficient patient flow inside the building. Focus was placed on minimizing the time spent in the treatment rooms to be able to treat as many patients as possible, which directed much of the design of the clinic. On a national level, the local hospitals had to remit the patient to a university hospital, which in turn would need to evaluate each individual patient's suitability for proton treatment at Skandion.

In hindsight it is clear that the estimation made by KAS of treating 1000 patients per year, was not realistic due to the time consuming and complex assessment process, requiring a huge amount of coordination. This also became evident when assessing the number of patients being treated from August 2015 to 2017. During those years, a total of 434 patients was treated –

representing an average of 300 patients being remitted yearly to the Skandion clinic (UNT 180221; Läkartidningen 181126). In a report by the Swedish Cancer Foundation, the director of Skandion mentions several difficulties in attracting patients to the clinic, such as difficulties in understanding whom the treatment is suitable for (as other therapies are also sufficient) and the lack of standard procedures and protocols (Cancerfonden, 2017: 124). Thus, in designing the building, it was mainly aspects that would affect the flow of patients *inside* the building that was taken into account, not the external aspects influencing the overall flow of patients *directing* them to the building.

The influence of the med-tech supplier - directing requirements of the building

The demands from the equipment supplier (IBA) to a large extent directed the design & planning of the building and was also important in relation to production and coordination, but did not join the actual design & planning organization. All requirements, based on technical features and experiences from earlier projects, were summarized in an Integrated Building Document (IBD) providing measurements and details of the treatment rooms. The IBD (consisting of a 100 page document and 40 drawings) was a formal appendix to the procurement contract signed between KAS and IBA.

As the IBD document was hard to interpret, the design and planning coordinator, the architect, and representatives of AH, NCC and KAS visited healthcare facilities world-wide in order to understand how to implement the IBD and get a clear picture of the healthcare processes with the involved equipment. Much of the interaction between IBA and these main actors revolved around the IBD document as it could be interpreted in different ways.

Partnering as facilitating communication

To translate the requirements from KAS as well as the requirements set up by IBA into production drawings that would fit the production organization was a challenging task as it was about managing requirements from various actors. Concerning the partnering contract, the planning coordinator conclude that it has influenced the project work in that is created an arena for constant feed-back. She further express the partnering contract as positive as it was: "the first time I was in a situation where we would 'meet' and contribute with our own competence and knowledge without causing irritation". The production manager at NCC comments the partnering contract as: "you give and take and collaborate to find the right solutions concerning procurement, planning and delivers it's been very open [communication and interaction]". While the project manager of AH explains the outcome of partnering as dependent on the involved parties: "the result of this kind of project is related to the interest of those who participate…you have to think it created value to work with this. It is not only due to economic terms". Both NCC and AH express their satisfaction to work with partnering and make use of each other's' competences and skills, which also caused spillover effects to other main actors including IBA, KAS, planning consultants and subcontractors.

ANALYSIS

This paper set out to investigate how partnering influences the construction of effective health care facilities in terms of the inter-organisational interaction that this collaboration is a part of over time. The analysis presents some of the central interfaces over time and space identified in the Skandion case that affected how partnering could be implemented in the project. First, we present the interfaces related to the project itself, followed by the interfaces of which the resulting building needed to become an integrated part.

When it comes to the interfaces related the project itself a central result is that the partnering agreement was part of a long-term relationship between the two parties of AH and NCC, as well

as of earlier collaboration with others in the project organisation, such as the planning coordinator, consultants and several subcontractors. As part of several established relationships, partnering was introduced as way of handling risks and uncertainties, as well as creating opportunities of jointly coming up with innovative solutions for the project execution and the building. As such, the partnering agreement and its resulting practices during the project worked very well, which confirms the importance of earlier relationships for the performance of partnering (Eriksson & Nilsson, 2008). This did not however include the newly formed user-related organisation KAS. In addition to this being a new actor interface to handle, KAS was an immature organisation that lacked experience and knowledge of construction projects which increased the uncertainty of the project. In addition, it had no ongoing health care activities in Sweden to relate its new activities to – there was little point of reference for understanding what was required for this type of health care service in terms of how it would be operated and used. Therefore, this user organisation mainly contributed with the set-up of the patient flow in relation to the radiation equipment *inside* the building - these requirements were clear and relatively easy to relate to. IBA was also a new actor in relation to the already established relationships in the project, but greatly influenced the direction of the project and the building through its tough requirements on installing and operating the cyclotron. As such, IBA had direct requirements concerning the actual construction of the clinic, which affected all the project actors in one way or the other. In turn, this led to a number of interfaces being created to other IBA-facilities worldwide as there was a need to understand the requirements in practice. As such, partnering was an effective way of *re-using* and *strengthening* the relationships that had been *established* in earlier projects. Consequently, AH and NCC developed new ways of working that also included several of the other actors representing established relationships. However, which *new* relationships that could be used in an effective way depended greatly on the capacity and role of these new actors. While IBA as the med-tech supplier got a central role and a strong influence on the final design of the building, KAS was not able to act a relevant counterpart to AH and NCC, or the other indirectly involved actors in the partnering constellation. This implies that while partnering is applied to optimize the outcome of individual projects and mainly applied to the relationship between client/developer and contractor, its success is highly related to *past*, *present* and *future* interactions of *several* of the project actors, and the possibility to actually engage in interaction at all – the necessity of being a relevant counterpart (Håkansson et al., 2009). This blurs the practices and concepts of project- and strategic partnering as project partnering is never just related to the direct inter-organizational interfaces of the individual project, but related to a number of indirect interfaces across time and space beyond the scope of the individual project. This has been discussed by Eriksson (2015) as a strategic aspect of supply chain integration. However, what our case shows is that these interfaces are not only part of the immediate supply chain, but of the wider user system in which the building is to become an integrated part.

As was shown in the case, the aspect that was *not* taken into account was how the resulting Skandion Clinic was to be part of a patient flow within a larger health care system encompassing a number of different hospitals and local units across Sweden. These were demands that KAS had difficulties of both identifying and conveying to the rest of the project organization. Embedding Skandion as a cancer treating institution in the Swedish healthcare system proved to require a high level of adaptations between *a range of actors* in the healthcare system. The actors on the user side can be categorized as a) other cancer treating healthcare providers in the system at large and 2) central agencies monitoring treatment programs, guidelines and coordination of healthcare activities at a national level. The first category of actors was represented by the seven county councils of KAS. Despite the fact that the KAS organizations represented the largest university hospitals in Sweden, they did neither control the treatment processes of cancer patients at large, nor the coordination of patients between different healthcare institutions. To allocate patients across Sweden did not only require coordination between the larger hospitals but of numerous

other healthcare providers as well. The value of Skandion from a user perspective was thus dependent on how well horizontally integrated the clinic was in the cancer treatment chain. The second category of actors have an indirect interface towards Skandion as the central agencies monitor cancer treatment protocols, guidelines and handles central coordination of treatment. The role of these actors is to provide the "knowledge infrastructure" enabling healthcare institutions to direct their patients to Skandion. Without any such supporting mechanisms it is difficult to breach established treatment processes in cancer treatment and thus integrate the resources and activities of Skandion.

Thus, while partnering is implemented in health care construction projects to enhance communication among key project actors, the effectiveness of that communication depends on the actors' previous, present and future interactions as well on the larger user system into which resulting facilities need to become an integrated part. This suggests that an important factor to further evaluate in relation to the use of partnering in construction is the *scope of complexity* that it is equipped to handle, and the role of interaction between key project actors in setting that scope.

CONCLUSIONS

Managing a construction project necessitates coordination of a diverse set of different interfaces at the boundaries of different types of organisations through intense and short-term interaction. This paper has shown that in a health care construction project, this organization has to take into consideration that the resulting building is to become part of a number of both direct and indirect organisational interfaces in relation how it is to be operated. Managing health care processes is about vertical (from national to local level) and horizontal (between local units) coordination from a long-term perspective that cuts across the physical space of the individual hospital building. Consequently, if partnering is to increase the quality of constructed assets, and specifically health care facilities, it needs to represent an effective means of handling a complexity of different relationships and interfaces, both within and beyond the scope of the individual project and building. Relationship history matters greatly for the implementation of partnering, which confirms earlier research (e.g. Crespin-Mazet et al., 2015, Eriksson and Nilsson, 2008). However, established relationships are of assistance only to the degree to which they can inform of the wider organizational and temporal context in which the project and resulting building are to be operated. As such relationships can play a stabilizing role and partnering can be part of increasing this stabilization by deepening already established relationships. However, these relationships are only a part of a wider network of actors, resources and activities, not least in relation to connected user environments.

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