EXPLORING THE INTRODUCTION OF A NEW ACTOR ROLE IN A CONSTRUCTION PROJECT SETTING

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INTRODUCTION

The construction industry is a complex industry in which all activities occur in projects. Construction projects are to their definition temporary and inter-organizational with multitude of different actors working together (Bakker, 2010; Dubois and Gadde, 2002). The work is done through several sequential and parallel process that needs to be coordinated through the entire project lifecycle. The temporary nature of construction projects also means that the actors involved in construction projects differ between projects. This has been seen as a challenge for innovation and change of the construction industry, and has therefore been characterized as conservative and reluctant to change. However, this is a disputed claim in the construction research community (cf. Löwstedt and Räisänen, 2014). To improve innovation and inter-organizational integration the construction industry has seen an increased use of collaborative efforts (Bygballe *et al.*, 2010; Karrbom Gustavsson, 2018). In order to support efficient production as well as improving safety, and reducing environmental impact have the construction industry actors intensified the work with supply chain management (SCM) and implemented third-party logistics (TPL) (Ekeskär and Rudberg, 2016; Sundquist *et al.*, 2018; Janné and Fredriksson, 2019).

Introducing a new actor, the TPL provider, challenges the traditional project setting and how construction work traditionally is being performed. In Ekeskär and Rudberg (2016) the construction contractors often had negative attitude towards the logistics solution. The contractors believed it to be expensive and unnecessary for the TPL provider to manage logistics activities when the contractors equally could have done it by themselves. The construction industry is facing many types of innovative solutions, out of which TPL solutions are one example (Bygballe and Ingemansson, 2014; Hedborg Bengtsson, 2019). This means that there are many construction projects, and actors within them, that need to cope with the introduction of new actors. *There thus appears to be a need for inter-organizational studies on the effects that come out of the introduction of new actors who challenge traditional project management*.

The general aim of this study is, therefore, to explore effects of a new actor in a traditional project setup and will be helpful in understanding how relationships evolve with innovation in temporary networks, i.e. projects. This will be done out of an industrial network perspective using the ARA model, an approach with over forty years of experience in studying inter-organizational relationships (Håkansson and Snehota, 1995). The study is of explorative nature and the following research questions are investigated:

- How does the introduction of a new actor role in a traditional project setting affect other actors?
- How does the new actor affect relationships between the other actors?

Following this introduction, a literature overview of the construction industry setting and the use of SCM and TPL in construction is presented. The overview is followed by a brief description of the theoretical framework of the industrial network approach. Then the research design is described followed by the descriptions of two cases together with research findings. Finally, a discussion and case analysis ending with a short concluding discussion.

LITERATURE OVERVIEW

Construction industry setting

As mentioned in the introduction the construction industry is organized in temporary organizations with several different firms acting as subcontractors (Bakker, 2010; Dubois and Gadde, 2002). This is a necessity since the products are large and immobile and have to be produced on the location of its future use. Therefore, a construction site can be resembled to a temporary factory that is built in and around its product (Bygballe and Ingemansson, 2014). This complex environment with a high degree of fragmentation with several subcontractors makes it harder to share experience and innovations through inter-organizational collaboration due to the loose couplings between projects and companies (Dubois and Gadde, 2002). However, this does not mean that innovations do not occur in the construction industry.

Two examples of innovation practices in construction that have had large impact and interest the last decade are building information modelling (BIM) and partnering. The use of computer aided design (CAD) and the evolvement into what is now known as BIM is an example of innovation in the construction industry which have changed how construction projects are planned, designed and produced. Likewise partnering have changed how construction projects are managed and increased collaboration between different stakeholders in construction projects (Bygballe and Ingemansson, 2014). Following the increased focus on SCM in construction is the use of TPL in construction projects. TPL solutions is an example of an ongoing process innovation in the construction industry (Hedborg Bengtsson, 2019). BIM, partnering and TPL are examples of new innovative practices in the construction industry that often comes with new actors that challenge the traditional way of working in the construction industry (Karrbom Gustavsson, 2018; Havenvid *et al.*, 2016).

Third-party logistics in construction

The use of TPL in construction is a new phenomenon in the construction industry for all involved actors, even though it has been used in other industry contexts before (Langley, 2015; Ekeskär and Rudberg, 2016). In a traditional construction project, the setup typically consists of a main contractor and a number of subcontractors who are specialized towards certain construction activities such as erection of loadbearing structure, complimentary construction (i.e. interior walls, floors, kitchen cabinets, etc.), electricity installations, plumbing, ventilation, etc. The main contractor is typically responsible for coordinating all activities on the construction site, including planning and sequence of the construction works. However, all construction activities are material intense and all that material has to be ordered and delivered to the construction site. Typically, it is the contractor that is responsible for an activity that also orders the needed material. It is also the responsible contractor that handles the material on the construction site by the contractor's own personnel.

The use of TPL solutions challenge the traditional project setting of a construction project. A new actor is introduced to perform activities usually done by the contractors themselves. Many TPL solutions are mandatory for the contractors to engage in and the initiative often comes from clients or cities, trying to reduce the construction projects impact on third parties (cf. Ekeskär and Rudberg, 2016; Sundquist *et al.*, 2018; Janné and Fredriksson, 2019).

Most studies on TPL in construction are done out of a SCM and logistics perspective. These studies describe how TPL solutions challenge the traditional construction project, however, they tend to focus on project performance and TPL solutions effect on that (cf. Ekeskär and Rudberg, 2016; Sundquist *et al.*, 2018; Janné and Fredriksson, 2019).

THEORETICAL FRAMEWORK

Understanding inter-organizational relationships through industrial network approach

The industrial network approach puts emphasis on the inter-organizational relationships between organizations; how they relate and interact with each other but also how they adapt in relation to each other (Håkansson and Snehota, 1995; Håkansson *et al.*, 2009). The framework takes its stance in three different but interrelated dimensions of relationships: actor bonds, resource ties and activity links, also known as the ARA model. Actors (firms, organizations and individuals) engage in activities which require resources, which in turn, are controlled by actors. From the standpoint that firms need to cope with and build interdependences to run and develop their operations, interaction is an essential part of the industrial network approach; no actor can control all activities and resources but are dependent on other actors (Håkansson *et al.*, 2009; Gadde *et al.*, 2003; Håkansson and Snehota, 1995). This makes the industrial network approach useful when studying the effects of a new actor in a traditional project setting, i.e. a TPL provider in a construction project.

Sundquist *et al.* (2018) study the use of a TPL solution using the industrial network approach and this affects the other actors in the three dimensions constituting the ARA model. Their focus is however on how the TPL solution impacts project performance. This study on the other hand more specifically focuses on the effects on the actors and their relationships.

The introduction of an actor in a new industry context and traditional setting is similar to the challenges of new business development. Havenvid and La Rocca (2017) examine the challenges of new business development in an interactive business landscape in terms of how this requires to establish a position and a ”face” in the existing network. The actor with experience of other industry contexts will just as the new venture have to establish new relationships in the new business network. The emergence of TPL providers in the construction industry is such an example. They bring with them experience and know-how from other industry contexts and business networks, out which some are applicable in the construction industry and some are not (Ekeskär and Rudberg, 2016). Havenvid and La Rocca (2017) express two challenges for new ventures in business networks: relating and networking. Relating implies initial relations with other actors and networking is relating to a diverse set of actors. The two challenges correspond to six interdependent spaces for action for the new ventures management team to address.

RESEARCH DESIGN

Dedicated construction logistics solutions using TPL providers is a phenomenon that has increased in Sweden for some years. However, the increase is from a low level, the vast majority of construction projects in Sweden are traditionally setup. Therefore, the introduction of TPL providers will in this study function as an example of an introduction of a new actor in a traditional project setting.

The research design in this study is based on qualitative study using a multiple case study approach following the approach described by Yin (2014). The study involves two Swedish construction projects that utilizes a dedicated construction logistics solution operated by a TPL provider. The first case is the Future University Hospital (FUS) project, which is a refurbishment project of the university hospital in Linköping, Sweden. The second case is the ongoing urban development project Stockholm Royal Seaport (SRS). In both cases the projects were divided into separate and sequential stages, and it is one of the stages in both projects that is of focus in this study. When conducting an investigation of inter-organizational relationships in industrial networks, a case study approach is suggested (Easton, 2010). Case studies are also considered useful when studying new phenomena in exploratory research (Voss, 2009), answering questions of *how* (Yin, 2014).

In both cases there are a dedicated construction logistics solution mandatory for all contractors to use. However, the setup of the logistics solution as well as the origins of the solutions were different; in the FUS project it was the client who decided to use a TPL solution, while in the SRS case it was the municipality (i.e. the city of Stockholm). In the SRS case there are also several clients, while in FUS there are only one.

The two cases have other similarities as well. However, the SRS can be seen as a multi-project since it consists of several housing projects. Therefore, there are several main contractors involved in SRS, as well as several clients. In the FUS project there was one main contractor responsible for coordinating the construction activities in the construction project. The project was organized with several side-contract collaboration groups, consisting of four different subcontractors responsible for structure completion of a number of floor levels per side-contract, and where helpful

As construction projects FUS and SRS are very different; with FUS being a refurbishment project of an existing and fully operative hospital, and SRS being development of new apartment buildings. However, the two cases were not chosen based on their similarities nor their differences, but rather to complement each other and to show two different examples of how a TPL provider affect construction projects.

For both cases, the empirical data is based on semi-structured interviews with various managers including client, main contractors, subcontractors, transport provider and the TPL providers. Additional data has been collected through several participatory observations on the construction sites, at suppliers and on coordination meetings between contractors and the TPL provider. The data of the FUS case were collected between 2013 and 2015, and the data collection from the SRS case is ongoing. The two cases are analyzed using the ARA-model described by Håkansson and Snehota (1995).

THE TWO CASES

Case 1: The Future University Hospital in Linköping

When the university hospital in Linköping was about to be refurbished the client, the county council of Östergötland, decided to use a TPL provider to manage all the logistics on the construction site. Initially the project was intended to be run traditionally, but when the client realized the impact the construction work would have on the fully operational hospital, they decided to procure the TPL provider. In order to speed up the procurement process the client ordered the main contractor to procure the TPL provider, which caused annoyance from the main contractor who thought that they could manage handling the logistics in the project since they were more experienced in handling construction materials compared to the TPL provider. This attitude from the main contractor led to that TPL solution often was neglected by the main contractor, which then also spread to the subcontractors.

The fact that the construction project would use a dedicated construction logistics solution was written in the tender documents and therefore known to all contractors working in the project. The TPL solution was setup according to the principles of just-in-time (JIT) and no materials were allowed to be stored on the construction site. TPL provider handled all the incoming materials on evenings and nights when the construction workers had gone for the day. The TPL provider also had the appropriate equipment to handle incoming materials such as forklifts, cranes, etc.

The contractors in the FUS project had initially a negative attitude towards the construction logistics solution; they experienced it to be expensive compared to if they had done the materials handling themselves. The logistics solution also required more planning compared to what the contractors were used to. However, as the project progressed the attitude changed for most of them and they could see that it was a necessity to organize and manage logistics, and other related issues in such a large project with extensive risks for third parties. Some

contractors could also reduce the number of construction workers in the project due to the work being done by the TPL provider. Some contractors also intensified their relations with a large transport provider and used their existing terminal in Linköping for storage of construction materials. The transport provider in turn could coordinate better and co-load deliveries to several contractors.

In order to coordinate between the contractors, the TPL provider established weekly meetings for coordinating incoming deliveries. The meetings also tended to focus on other issues of practical matters of the construction project such as heaters and toilets. However, even though the meetings were mandatory for several actors, including the main contractor, the meetings were often neglected and only the contractors with a positive attitude towards the TPL solution attended.

Case 2: Stockholm Royal Seaport

Stockholm Royal Seaport is an ongoing urban development project in Stockholm where the city of Stockholm is developing 12,000 apartments and 35,000 workplaces between 2011 and 2030. The construction work is separated in sequential and parallel stages, and of focus in this case study is the stage Brofästet that includes nine housing developments with main contractors from seven different companies (some projects uses the same main contractor, although with different project organizations). Early on in the planning of SRS the city of Stockholm decided to use a dedicated logistics solution called construction logistics center (CLC) and that was to be operated by a public procured TPL provider. The aim was to reduce impact on third parties and increase environmental sustainability of urban development projects.

The CLC was setup with a terminal for material storage and no material were allowed to be stored around the building. When the contractors were in need of a material, they requested it from the CLC who delivered it to the contractors free of charge. Certain deliveries could be transferred directly to the construction sites, but had to be coordinated with the CLC. For the contractors this meant increased flexibility even though they also thought it was expensive. The CLC was also responsible for collection of waste materials for recycling, gates and fences, snow clearing, surveillance, etc. There were also some additional services such as providing certain machines, logistics consultants, inward transport of materials, etc. However, most of the contractors only used the basic services since the additional services were considered too costly.

The CLC is mandatory to use for all actors in all construction projects in SRS. During the Brofästet stage the operator of the CLC changed due to a new procurement. With the procurement of a new operator some changes to the TPL solution was made as well. The CLC became more independent from the city's project management and the site manager of the CLC was now seen as a representative of the city, and had therefore a larger mandate to make decisions on services and of how the CLC could act towards the contractors. The new version of the CLC had a larger focus on coordinating activities between different projects involved in the Brofästet stage. For instance, a weekly meeting was held to coordinate the contractors' activities. This meant that the contractors could plan their activities more proactively. The meetings also became a forum for all contractors to regularly meet and to discuss both formal and informal matters.

DISCUSSION AND ANALYSIS

The introduction of a new actor role in the two case projects can be categorized as causing direct and/or indirect effects; with indirect effects being caused as a result of other effects. In Table 1 the inter-organizational effects in the three dimensions in both cases are listed.

Besides the identified inter-organizational effects there were also a number of indirect intra-organizational effects identified. This means that the introduction of a new actor does not only affect the construction projects in relation to other actors, resources or activities, but also within

organizations and how they are able to perform their work. The identified intra-organizational effects were mainly a result of the setups of the TPL solutions and were found in the resource and activity dimensions. An example of one such general intra-organizational effect in the resource dimension was the increased cost of utilization of resources; the contractors often had better deals for some of the services included in the TPL solutions.

Table 1 – Inter-organizational direct and indirect effects of using a TPL in the two cases

Case	Actor bonds	Resource ties	Activity links
FUS	Introduction of new actor role (TPL) (*direct*) Intensified interaction between several actors (*indirect*) Establishing interface between supply network and construction site (*direct*)	Establishment of dedicated resources for logistics and materials handling (*direct*) Better utilization of resources (*indirect*)	Transfer of activities to new actor (*direct*) Transfer or extension of activities to other times of the day (*direct*)
SRS	Introduction of a new actor role (CLC) (*direct*) Increased interaction with actors of other projects and competing firms (*direct*)	Establishment of dedicated resources for logistics and materials handling (*direct*) Establishment of a forum for coordination of construction activities (*direct*) Establishment of terminal for material storage (*direct*)	Transfer of activities to new actor (*direct*) Increased coordination with other projects (*direct*)

Starting with the actor dimension, in both cases the introduction of the TPL provider as new actor in the construction projects results in new actor bonds. Since the TPL solution was mandatory in both cases the TPL providers had relationships with all contractors. This effect is in turn directly related to the transfer of activities to a new actor (listed as new activity links) since tasks the contractors traditionally are responsible for were taken over by the TPL providers. In FUS the transfer of activities went further than in SRS, since all materials handling was conducted by the TPL provider. Related to these effects are two intra-organizational effects; it enabled the contractors to focus on core activities, i.e. construction, and also had the effect that some contractors could reduce the number of construction workers on site and move them to other construction projects.

The introduction of the TPL provider also established the use of dedicated resources for logistics and materials handling. These resources differed between the two cases. In SRS the terminal for material storage together with machines for loading and unloading as well as delivering materials up to the construction site was included. However, unlike FUS, cranes were not included and was something the contractors had to manage by themselves which led to that all contractors had a crane of their own. In turn this required extensive coordination in order to avoid accidents. With increased cooperation between the contractors in SRS, shared cranes could have been an option, however then the planning and operation of the included construction projects would have had to be planned and coordinated together.

The setups of the TPL solutions differed between the projects and therefore also had different implications for the actors in the networks. Since FUS relied on JIT deliveries with no material storage on site some contractors intensified their relations with actors in the supply network. An indirect effect of this in the resource dimension was reduced inventory levels at the construction site. The intensified interaction with sub-suppliers together with regulations on

how and when deliveries to the construction site could be made established an interface between the upstream actors in the supply chain and the actors on the construction site. If this is true also for the actors in SRS remains unclear and is therefore not listed as an effect. In both cases the TPL solution forced the contractors to plan their activities proactively, as a result of a new actor with regulations and procedures the contractors were not familiar with.

The use of a terminal in SRS increased flexibility for the contractors since they could manage variation in production and did not at the same time have to worry about deliveries and materials. The CLC could deliver the needed materials up to the construction site when needed. However, this could sometimes be troublesome since the contractors did not always know what they had in storage and what they needed. This is a problem that comes back to bad planning and is not an effect of the TPL solution.

The CLC's efforts of coordinating activities between different construction projects also eased the planning efforts; having several actors working close together within a limited area means that they all affect one another, which had to be planned for. The regularly meetings became a natural forum to address different issues that came up and also established better relationships with the included actors. The relationships did not go as far as in partnering relationships and the main contractors did not have any obligations to each other, but had different degrees of cooperation between each other. How far the cooperation between the contractors went remains unclear, and is an area for future studies. However, the CLC can be seen as a system integrator for this type of cooperation.

Concluding discussion

By introducing a new actor role in a traditional setting all three dimensions constituting the ARA model are affected. Some of the effects are the same as the ones found by Sundquist *et al.* (2018). The contractors included in the study have mixed attitudes towards the use of the solution. Their concern lies with the success of their projects and therefore express negative attitudes towards e.g. the costs involved in this type of solutions. However, they also express that TPL solutions are a necessity in complex projects, implying that hospital projects and urban development projects are more complex than other construction projects. Effects within the actors' organizations were hard to monitor as the TPL solutions were considered project specific by the contractors and the introduction of TPL solutions in the two cases did not have any larger effects in the actors' organizations outside the specific projects, in-line with the findings by Dubois and Gadde (2002).

In this study the two cases have a lot of similarities; in both cases it is a TPL solution that is introduced in the traditional construction project setting. Therefore, the effects are similar in both projects. A case with the introduction of another type of actor role, e.g. a BIM coordinator, would probably have other types of effects for the involved actors.

The two challenges, relating and networking, for new ventures identified by Havenvid and La Rocca (2017) are eased by the fact that the TPL solutions are mandatory for the contractors to use. Thus, it will surely affect the nature of the relationships in the network and the TPL provider may have to work harder in order to justify its existence towards the contractors. The project based nature and loose couplings described by Dubois and Gadde (2002) remains a challenge for TPL providers in establishing a long term acceptance by contractors in the construction industry as well as have an effect within the contractors' organizations outside the projects. Therefore, just as any new business development in an existing business network, they are dependent on other actors (Havenvid and La Rocca, 2017). Since they do affect the actors in construction projects, and therefore challenge how business traditionally has been performed in the construction business network, it can be questioned if mandatory requirements on TPL solutions works in their favor. As concluded by Havenvid *et al.* (2016) mandatory requirements

can act as renewal in construction projects, but then it has to involve several actors and interaction processes in all three dimensions of the network.

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