

This file was downloaded from BI Brage,  
the institutional repository (open access) at BI Norwegian Business School  
<http://brage.bibsys.no/bi>

## Managing renewal in fragmented business networks

Malena Ingemansson Havenvik  
Norwegian University of Science and Technology – NTNU

Håkan Håkansson  
BI Norwegian Business School

Åse Linné  
Uppsala University

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

*The IMP Journal*, 10(2016)1: 81-106

Publisher's version available at <http://dx.doi.org/10.1108/IMP-06-2015-0023>

Copyright policy of *Emerald Publishing Group*, the publisher of this journal:

“Emerald supports authors' voluntary deposit of their own work. Once an article has been published by Emerald, an author may voluntarily post their own version of the article that was submitted to the journal (pre-print) or the version of the article that has been accepted for publication (post-print) onto their own personal website or into their own institutional repository with no payment or embargo period.”

<http://www.emeraldgrouppublishing.com/openaccess.htm#green>

An additional written agreement between Emerald and BI Norwegian Business School states these rights to BI authors.

## Abstract

### **Purpose:**

We argue that the construction industry is characterised by a fragmented business context with three main features: the project-based character, the strong focus on price in all parts of the supply chain along with the great importance of suppliers. This fragmentation has been identified as problematic for the industry's ability to innovate and engage in renewal. The purpose of this paper is to investigate this further by focusing on how construction companies manage renewal in a fragmented business context.

### **Design/methodology:**

We use an in-depth case study of a housing project in Sweden to discuss how firms manage renewal in a fragmented type of business environment. We identify the challenge of achieving renewal in an individual construction company as an issue of handling intra- and inter-organisational issues in both intra- and inter-project environments.

### **Findings:**

Our case study indicates that renewal can be partly handled and managed through long-term business relationships and partly through opening up to new business relationships. Moreover, innovations and learning developed in other projects can be used in the focal project, and due to a repetitive task it is possible for the construction company to use a core network of individuals and organisations to enhance overall renewal among actors.

### **Limitations:**

The study needs to be supported by further empirical observations. The paper encourages IMP scholars to further investigate projects from an industrial network approach.

### **Originality/value:**

The paper addresses why firms in fragmented (project-based) businesses might struggle with achieving renewal in a novel way by outlining and investigating four organisational challenges they must handle.

*Keywords:* Construction industry, renewal, innovation, projects, inter-organisational relationships, ARA

## Introduction

Over recent decades, the ways in which innovation is initiated and realised has become an increasingly researched topic. The critical role that innovation plays in the promotion of economic growth, and the still elusive connection between the two, encourages studies that further explain how innovation takes place. The industrial network approach to these issues rests on a long line of empirical observations and case studies that demonstrate that interaction is fundamental for all types of changes including innovations, i.e. the widespread use of something new (e.g. Håkansson, 1982; Håkansson and Snehota, 1995; Håkansson and Waluszewski, 2007). These studies show that business relationships not only matter from a direct economic point of view (i.e. in making economic transactions) but for achieving learning, knowledge development and innovation (Waluszewski, 1989; Lundgren, 1994; Laage-Hellman, 1997). Important features of these relationships are that they are long-term, based on adaptations, primarily informal and are both directly and indirectly related to a variety of actors and individuals on both the buying and selling sides. Business relationships with these features have thus been shown to play significant roles in technical, social and economic change involving innovation and learning.

In the industrial network approach, innovation is viewed as the result of interaction processes among several parties that adapt their resources and activities in relation to each other in problem-solving and attempting to achieve increased efficiency. Interaction is the very process that enables the individual firm to relate to its counterparts in new ways. This is viewed as a process of forming and re-forming *actor bonds*, *resource ties* and *activity links* (Håkansson, Ford, Gadde, Snehota and Waluszewski, 2009); the parties engage in problem solving and adaptation by finding new ways of forming social bonds, combining resources and linking activities over time. New resource ties form when technical and organisational resources of the involved parties are combined and recombined in different ways to create new solutions. The activities performed by involved actors can also be linked to each other in new and different ways through interaction. New ways for actors to relate or bond to each other, formally or informally, may be an effect of processes of combining resources and linking activities in new ways as well as a motivating force to engage in such processes (Crespin-Mazet, Havensvid and Linné, 2015). In this way, innovation relates to new ways of combining resources or linking activities within the network, and it will include learning processes for the involved actors (Dubois, 1998; Araujo, Dubois, and Gadde, 2003). To capture both the innovations being shaped through such processes, i.e. new resource combinations and activities links, as well as the learning processes related to them and other interactive activities, i.e. changes in how actors handle a resource, activity or counterpart, we will use the concept of *renewal*. Reasons for a firm to engage in renewal can include learning how to handle activities (development, purchasing, production and distribution, etc.), to use new resources or combine old resources in new ways, or it can be to combine counterparts in new ways. It is thus directly related to the existence and development of connected relationships in terms of actor bonds, resource ties and

activity links. This means that developing and connecting relationships is key to becoming part of the renewal process.

However, there are some business environments in which the above described types of interaction processes are particularly difficult and complicated, and the research question of this paper concerns how renewal is managed in such settings. In these business settings there are hindering factors for developing continuity and stable partners. One such example is the construction industry, which has three important characteristics related to renewal. The first is that the production activities are mainly project-based. This implies a fragmentation of the production activities into separate and time-bound projects (Winch, 2003) for non-standard products, which consequently requires non-standard production processes. The second is that traditionally most counterparts or partners are selected through tendering procedures based mainly on price for each project (Bygballe, Jahre and Swärd, 2010). This implies that in the selection of partners, the commonly used time horizon is that of 'the project' and the main criterion is the direct cost (the price). Thus there is a short-term focus in which the *indirect* costs and benefits related to dealing with particular partners over time become hard to capture and receive less attention. This means there are two fragmentising conditions in play: the project-based character that fragmentises the production activities, and the strong focus on bidding procedures in selecting partners, which contributes to keep the industry's actors at a distance. The third characteristic is the high degree of specialisation that characterises the industry where 75-90% of the total project construction cost comes from dealing with subcontractors and suppliers (Dubois and Gadde, 2000). This places great importance on the counterparts of construction firms (Holmen, Pedersen and Torvatn, 2005), but still, hierarchical and even adversarial type relationships are being reported between main and sub-contractors (Dainty, Briscoe and Millet, 2001; Tennant and Fernie, 2014). These three features, the project-based character and the strong focus on price in all parts of the supply chain along with the great importance of suppliers, have also been identified as problematic for the industry's ability to innovate and increase its productivity (e.g. Miozzo and Dewick, 2004; Dubois and Gadde, 2002; Tennant and Fernie, 2014). The discontinuity in production activities and adversarial-type relationships thus appear to hinder renewal, especially since a large number of suppliers make it highly important to utilise them for creating renewal. Our ambition in this paper is to investigate how construction actors manage renewal under these conditions. Hence, the research question for the paper is: *How do companies engage in renewal in discontinuous and fragmented types of business contexts?*

To investigate this issue we use the empirical material from an in-depth case study of how a construction company manages renewal in a housing project completed in Uppsala, Sweden. The case is used to illustrate the practices of single individuals and organisations in relation to managing the development of particular resources and activities across projects. Two theoretical sections precede the case study. Firstly, we outline the fundamentals of how renewal has been studied within the industrial network approach and secondly, we provide a more elaborate summary of earlier insights on the particular challenges of innovation and learning in business networks that are based on project organisation. The latter section concludes the analytical model of how we interpret the organisational challenges of construction firms to

manage renewal through its specific characteristics. This is followed by methodological considerations in relation to the case study as well as the model. Following the case study we apply the model to discuss which bonds, ties and links relate to renewal through interactive processes, and how the construction company and its project counterparts manage these processes. Finally, we look at managerial implications of managing renewal in discontinuous and fragmented type of environments.

## Renewal in Business Networks

One early result of studies within the industrial network approach was the dynamic role of business relationships. Those studies showed how key relationships on both the input and output sides of the firm were central for the firm's total development (Håkansson, 1982). The results suggested that relationships and networks were also central for knowledge creation and knowledge development (Håkansson, 1994). The connected relationships were shown to give the *stability* needed for making learning possible while simultaneously providing the *variety* needed to achieve change. Furthermore, it created a possibility for collective and especially joint learning among several inter-connected actors (ibid., p. 215). A central assumption was that one driving force for establishing close relationships is the heterogeneity of resources used. Consequently, this was the starting point for a number of studies where inter-firm interaction and business relationships were studied as directly related to technical development and innovation (e.g. Lundgren, 1994; Henders, 1992; Laage-Hellman, 1997; Waluszewski, 1989; Holmen, 2001; Brekke, 2009; Ingemansson, 2010; Linné, 2012). Through these and several other studies it could be concluded that the substance of business relationships, or the level of interaction between two or several parties, is connected to which type of learning and change is achievable (e.g. Håkansson and Prektert, 2004). While relationships characterised by a low degree of social and technical exchange are likely to result only in a small degree of learning and few changes in actor bonds, resource ties and activity links (in addition often only one-sided), cooperation based on mutual adaptations can induce joint learning both in relation to the resources and activities of the focal organisation and those of the counterpart. Further, if this cooperation also includes third parties, collective learning and change of interrelated resources and activities across several firm boundaries becomes feasible (Ibid; Cantillon, 2010; Håkansson and Ingemansson, 2011). Hence, the substance of business relationships, the type of exchange they entail and whether they are connected determine what is possible to achieve in terms of renewal in the network.

In analysing the interaction processes taking place among different parties, the industrial network approach separated the substance of relationships into the three different layers of *actor bonds*, *resource ties* and *activity links* (Håkansson and Johanson, 1992). The layers refer to how actors relate on a social level (bonds), how they combine technological and organisational solutions (ties), and finally, how they are interrelated through the various activities they perform (links). Interactive processes between firms are necessary when using and developing critical resources, and it has been demonstrated that resources can be technical (products and production facilities) or organisational (business units and business relationships) in character (Håkansson and Waluszewski 2002). In turn, this means that there are various ways in which

resources can change and create economic effects; the same resource can create different effects depending on which other resource(s) it is combined with and in relation to which firm(s). From this interpretation, innovation becomes the process of combining old and/or new resources in new ways across firm boundaries (Ingemansson, 2010). Moreover, this combining process represents a type of activity – development – that can lead to learning among the involved actors. However, learning can also happen as an effect of combining a variety of activities, such as one firm connecting its logistics activities to another firm’s production activities (Jahre et al., 2006). Actors can also make adaptations in how they interact and relate to each other, both formally and informally, as well as develop bonds to new counterparts. Finding new ways to develop bonds over time, either through formal contracts or informally, may also enable the development of new resource combinations or activity links (e.g. Crespín-Mazet, Havensvid and Linné, 2015). In this way, the three layers are interdependent; new resource combinations can be dependent on changing existing activities and vice versa, which in turn can be connected to the formation of new actor bonds or developing existing ones (Håkansson et al., 2009). Innovation and learning are thus an effect of adaptation processes between firms as they relate their resources and activities to each other, which through existing or new actor bonds will include learning for the actors involved.

The above mentioned research insights were mainly conducted in traditional industries characterized by well-structured business networks (Håkansson et al., 2009) such as the automotive industry (Gadde and Jellbo, 2002; Fredriksson, 2006), the steel and the engineering industry (Laage-Hellman, 1997; Håkansson, 1990), the paper and pulp industry (Waluszewski, 1989; Henders, 1992), life science (Waluszewski, 2004; Ingemansson, 2010), and the fishing industry (Olsen, 2014; Hoholm, 2011; Abrahamsen and Håkansson, 2012). However, the main issue of this paper is to investigate renewal in another type of business situation characterised by obstacles to development of stable business relationships and structured networks. The next section outlines central literature in relation to a project-organised business environment, an environment in which the construction industry operates.

## The challenges of achieving renewal under fragmented conditions

### The challenge for firms of relating actors, resources and activities within single projects

A project organisation, i.e. the composition of a set of actors that are to interact for a limited time concerning a particular task, has been shown to have some specific intra-organisational features. This in turn appears to affect how it can engage in renewal, i.e. how it stimulates learning among the actors involved and the achievement of innovation. According to Hobday (2000), the strengths of the project organisation are flexibility and the production of complex product systems (e.g., construction). However, this in turn requires efficient control and resource-coordination, which is related to one of this type of organisation’s main weaknesses – namely, how to connect the project to the use of resources and activities within the broader organisation in which the project exists. Therefore, connecting the project to the broader organisation is also identified as a main problem of project organisation; capturing what has been developed and learnt in individual projects, and conveying this knowledge to the senior

management of the respective actors and subsequently to other projects (Hobday, 2000; Principe and Tell, 2001; Scarbrough, Swan, Laurent, Bresnen, Edelman and Newell, 2004; Swan, Scarbrough, and Newell, 2010; Hartmann and Dorée, 2015; Keegan and Turner, 2001; Brady and Davies, 2004; Grahber, 2004). According to Bresnen, Goussevskaia and Swan (2004), the processes of learning and embedding new knowledge in projects on the one hand, and embedding that knowledge within the wider firm on the other, need to be understood as contingent upon different ‘logics of action’, and thus as being tied to working practices of the actors:

*“They [project organisations]... pose particular challenges for attempts to diffuse and embed new knowledge and learning within the firm, due to their decentralised nature and time-constrained ways of working which, when combined with loose coupling between projects, create highly distributed working practices.”* (ibid., p. 1536)

Thus, the process of interacting intensively with new people for a shorter period of time on a particular task affects how learning and knowledge production are achieved, and how these experiences can subsequently be diffused to the wider organisation. This has implications for the level of learning, including both *what* type of knowledge is produced, as well as *how* it is produced. First, it implies that knowledge barriers need to be crossed; actors with different knowledge and experience must learn to communicate and collaborate to complete the project. Therefore, the level of learning, as well as the level of new knowledge produced *within* projects, is high (Ayas and Zenuik, 2001; Scarbrough et al., 2004). Secondly, as there is a new task or problem that needs to be solved, the project team will focus its work on, and adapt its practices to, that specific task. This is positive in terms of completing the project, but means that knowledge gained from the project is very different from what is learnt in the wider organisation and also from other projects (ibid).

From an industrial network approach, the single project can thus be seen as a temporary resource constellation and activity pattern in which the actors form a distinct logic in how to learn and develop new solutions in relation to each other. This implies that the resources and activities used in the project are only temporarily adapted to complete the project, while they might not change in relation to how they will continue to be used by the broader organisation or in subsequent projects (Gadde and Dubois, 2010). It means that the learning processes between the actors, and adaptations of resources and activities, are connected to the project task as well as to the specific actors involved. This is also suggested by Lundin and Söderholm (1995) who claim that in the case of a unique task, i.e., something that none of the actors has ever done before and likely won’t do again, might require a unique kind of organisation. In this situation, nobody knows beforehand exactly how to act, which requires a more flexible and creative type of action. However, in the case of a repetitive task, a repetitive type of ‘temporary’ organisation may be required, in which the actors already know what should be done and by whom. The latter case thus requires prior interaction.

The intra-organisational challenge of achieving renewal through projects can thus be identified as the difficulty of transferring project-specific adaptations of resources and activities, as well as the actors’ way of learning in relation to each other, back to the permanent organisations of

the involved actors. However, these insights show that renewal through projects does not only entail an intra-organisational challenge of transferring knowledge and learning to the broader organisation of the actors involved, but also an inter-organisational one. Turning to the construction industry, here projects consist of a great number of different companies and organisations that come together for a particular task (Winch, 1998; Slaughter, 1993; Jones and Lichtenstein, 2008; Gadde and Dubois, 2010). As the completion of the project depends on the close collaboration of these different parties, learning and adaptation processes will in turn depend on how they relate to each other. Let us now look further into the characteristics of the construction sector and how the challenge of obtaining renewal, i.e. innovation and learning, in this particular industry can be interpreted from a network perspective.

### The challenge of developing and using actor bonds, resource ties and activity links across projects; the inter-organisational setting of the construction industry

In each project the construction company usually plays only a minor part in all activities; suppliers of products and services account for the major part (Dubois and Gadde, 2002). This creates special challenges for renewal within each project (Håkansson et al., 2009), and is not just a matter of managing single or separate relationships; all major relationships between two counterparts have important connections to the other relationships of both counterparts (e.g., Håkansson and Snehota, 1995). Therefore, relationships are embedded in a network of relationships, which means that construction companies can be seen as embedded in network-like constellations through the activities and resources that interconnect them to other business actors (ibid; Håkansson et al., 2009). The construction business has been characterised as a 'loosely coupled network' (Dubois and Gadde, 2002; Dorée and Holmen, 2004) in which temporary adaptations are made in relation to projects that are rarely transferred to the more 'permanent' network. Cova, Mazet and Salle (1996) similarly refer to this permanent network as the 'milieu' of the single project, which, if relating to a set of business and non-business actors from a more long-term point of view, allows the construction firm to coordinate its resources and activities in relation to the network and anticipated projects in a more systematic way. Thus, project-based firms, and more specifically construction firms, are identified as depending on developing and using long-term relationships with relevant counterparts to be able to engage in a systematic use and development of resources and activities.

The INPM (International Network for Project Marketing and Systems Selling) research community identified the challenge of project-based firms to engage in relationships as dealing with relationship management on two interrelated levels: the project level and the company level (Cova and Salle, 2007; Skaates and Tikkanen 2003; Tikkanen, Kjuala and Aartto, 2007; Hadjikhani, 1996). The project level refers to the management of relationships and networks related to individual projects. The company level refers to the management of relationships beyond the single project and relates to long-term relationships, which can go into 'dormant' phases (Hadjikhani, 1996) in periods between relevant projects (Tikkanen et al., 2007). It is important to form relationship portfolios related to both the project and company levels, while the purpose of the former is to develop and maintain relationships with profitable customers for



the sake of achieving lucrative projects, the latter is to gain access to crucial resources in the network to create a strong network position from a more long-term standpoint (Ibid.).

Thus, there are inter-organisational challenges related to handling business relationships in individual projects as well as in the firm's network across projects. Construction projects can thus be seen as inter-organisational in relation to both the single project and in relation to several projects over time. Individually, they consist of a multitude of actors representing diverse organisations and companies (e.g., Jones and Lichtenstein, 2008). Over time, they are directly and indirectly interconnected to other projects and organisations (e.g., Braun, Müller-Seitz and Sydow, 2012), i.e. to the milieu (Cova et al., 1996). This inter-organisational setting and the increased specialisation within the construction industry (Dainty et al., 2001) means that learning and adaptations often must take place in the interface with other actors. Consequently, there is a need for *joint* and/or *collective learning* to change any practice, technical item, or service (Håkansson and Ingemansson, 2011). This argument comes from the interconnectedness of business resources across company borders; just as for an individual firm, the resources of an individual project are interconnected across the organisational borders of all the actors directly and indirectly involved in the project and require interactive behaviour to become useful. Following Dubois and Gadde's idea (2002) of the 'temporary' and 'permanent' type of networks in the construction business means there can be some actors who worked together before and changed some resources and activities in relation to each other – i.e. there have been adaptations made in relation to a 'permanent' network. However, it also means that most of the resources used in a project are developed from the standpoint of conditions 'outside' of the project and the relevant actor constellation, which then can only be adapted temporarily – i.e. make provisional adaptations in relation to a 'temporary' network. Hence, there is a set of adaptations and relationships on the company level relating the firm to a 'permanent' network, and for each project adaptations will need to be made in relation to the relationships formed in a 'temporary' network.

While project organisation seems well-suited to handling production under new and uncertain conditions, and learning levels are high *within* projects, its temporary and one-off nature make it problematic to capture learning and temporary adaptations to achieve long-term change, i.e., renewal (Hobday, 2000; Principe and Tell, 2001; Scarbrough et al., 2004). This is also generally recognised in the construction literature. On the one hand, project organisation is viewed as helpful in promoting creativity and flexibility as there are problems that need to be solved within a certain timeframe (e.g., Winch, 1998), but on the other hand, unfavourable in achieving long-term renewal, as isolated projects create discontinuity in knowledge development and transfer within and between firms (Gann and Salter, 2000; Miozzo and Dewick, 2004). Since any renewal in construction requires that several actors adapt and learn within the project, there will be problems when attempting to transfer the knowledge and adaptations made to the next project. The inter-organisational character of construction projects, and their uniqueness, thus complicates the process of utilising resources and counterparts, and linking activities across several projects.

## Specifying the research question and analytical model

The two preceding sections suggest that, in an individual project, there is both the issue of how the individual company learns and benefits from the project (intra-organisational issues in the intra-project environment), and how its counterparts learn and benefit from the project (inter-organisational issues in the intra-project environment). However, the greatest challenge to learning and achieving innovation appears to lie in how to transfer knowledge and temporary adaptations from one project to the next, which relates to the issue of new and earlier-used counterparts changing in relation to something 'new' (inter-organisational issues in the inter-project environment). As such, the individual project is part of both a broader temporal and organisational context; it involves actors and resources that have particular features developed over time and across organisational borders 'outside' the project. It also involves being part of a continuum of several projects, including both new and recurring actors (Cova et al., 1996; Brady and Davies, 2004; Manning and Sydow, 2011; Braun et al., 2012). This strongly suggests that to understand how project participants can engage in renewal, we must also pay attention to the wider inter-organisational context in which they operate, of both an inter-organisational and inter-project kind.

Table 1 shows a matrix of four organisational issues that any individual construction company needs to manage to achieve renewal. The cells outline different challenges in terms of organising *internally* in relation to renewal and handling *external* actors and their investments/renewal. These two aspects – the intra-organisational and the inter-organisational – appear in both individual projects (intra-project) and across projects (inter-project).

### ***Placement of Table 1.***

For construction companies, managing intra-organisational issues in relation to renewal in individual projects refers to assembling a production team and other resources to handle different activities as efficiently and smoothly as possible, which in turn depends on the organisational structure of the company and its abilities to do so (cell 1). Thus, it is an issue of handling the internal structure of activities and collection of resources. As this refers to managing problem-solving in relation to the specific project's task, it is about selecting the most suitable team for that task, which also includes handling the three other cells. Referring back to Lundin and Söderholm (1995), the composition of the teams can be connected to the nature of the task, i.e., a repetitive type of task is associated with recurring teams, while unique tasks require unique teams, which will also affect how the issues outlined in the three other cells are handled. Within individual projects, this means that many solutions need to be negotiated among the participating actors and developed through collaborations (cell 2) (c.f. Winch, 1998; Gadde and Dubois, 2010). The issue for the construction company, therefore, becomes how to make use of the earlier adaptations made by other actors, and also how to make them use their own investments. This is a fundamental inter-organisational problem. Adding to this complexity, construction companies are both sequentially and simultaneously involved in several projects. This requires the use of internal and external resources and activities in the individual project and the mobilisation of these resources and activities across projects (cell 3 and cell 4) (c.f. Dubois and Gadde, 2002; Brady and Davies, 2004). The intra-organisational issue then becomes how to use the appropriate resources and activities for a selection of projects

in a systematic way, and how to coordinate the utilisation of counterparts, resources and activities across simultaneous and sequential projects. In addition, from an inter-project perspective, the basic inter-organisational problem of activating earlier investments and adaptations made by others, in combination with the activation of one's own earlier investments and adaptations, turns into an issue of initiating and maintaining mutual investments across several projects. Or, put differently, to develop new and make use of existing actor bonds, resource ties and activity links.

In a project environment such as the construction business, these four issues are certainly closely related and overlap, and need to be solved in a coordinated way. From an analytical point of view, however, it can be important to distinguish them from each other. The matrix will be used as an analysis of the following case study by pinpointing which actors, resources and activities are activated and mobilised in each cell and thereby reveal management of renewals taking place in terms of the formation of new bonds, ties and links.

## Method

This paper investigates how firms manage renewal despite the strong fragmentising factors in the business context of the construction sector. The context in which construction takes place is dominated by features such as the project-based character, the price focus and the high level of specialisation. Based on these characteristics we have targeted *the project* as the organisational and temporal setting in which construction firms interact with actors such as suppliers and customers by relating and adapting their resources and activities to each other. Using the industrial network approach we identify the construction project as an activated network of actor bonds, resource ties and activity links. Hence, in order to investigate how firms engage in renewal we need to identify how innovation and learning are related to this activated network of bonds, ties and links. In doing this we adopted a case study approach since it is suited for revealing complex interaction patterns stretching across time and space (Dubois and Araujo, 2007). Moreover, in gaining an understanding of *how* (Yin, 1994) and *why* (Eisenhardt, 1989) project actors adjust, and related resources and activities in particular ways, the case study is a suitable research approach.

The case study is part of a larger study of investigating innovation in the Swedish construction industry. The larger study includes: 1) an encompassing survey of innovation in the Swedish construction industry (e.g. Ingemansson, 2012; Håkansson and Ingemansson, 2013), 2) comparisons with the Norwegian construction industry (Bygballe and Ingemansson, 2011; Bygballe and Ingemansson, 2014), and 3) three in-depth case studies of construction projects regarding business relationships and specific innovation processes (e.g. Crespín-Mazet, Havensvid and Linné, 2015; Havensvid, Håkansson and Linné, forthcoming). This paper concerns one of the three in-depth case studies mentioned. We conducted more than 40 interviews with project participants stretching across the three projects, of which 10 interviews relate to the focal project for this study, Östra Orgeln. The focal project is a large housing project in the centre of Uppsala coordinated by one of Sweden's largest construction companies, NCC Construction. We collected data mainly through interviews and through on-site visits. The respondents represented the main organisations of the project: the focal construction company,

the customers and the main suppliers/subcontractors. All respondents have managerial positions, are directly involved in the focal project, and have extensive information and experience with the focal project. Each interview lasted about an hour. For the focal project we conducted three interviews with the construction company: one interview with the project manager, one interview with the entrepreneur manager, and one interview with the site manager. Three of the interviews were with customer representatives: one interview with the project leader for NCC Housing, one interview with the construction manager of Uppsalahem, and one interview with the project leader of Uppsalahem. We also did one interview with two project leaders of the frame supplier, one interview with the project leader of the electricity installation company, and one interview with the project leader of the ventilation company. Finally, we also did an interview with the technical building consultant.

The interviews first aimed at identifying new methods, facilities, products, business relationships and new ways of organising construction by focusing on four main functions of the construction object: 1) design/construction 2) electricity, 3) indoor climate, and 4) environment/sustainability. After identifying a number of innovations or new ways of organising construction we asked how they came about, i.e. who initiated them, why and when? By doing this it was possible to capture the interconnectedness of innovation to other actors. The data from the interviews were transcribed and we reviewed the data to identify particular actors, resources and activities related to the focal project (Östra Orgeln). In doing this it also became clear that the focal project was part of a special way of handling construction between the construction company, NCC and Uppsalahem, one of the customers in Östra Orgeln. Throughout a number of projects Uppsalahem and NCC had formed an alliance/partnering relationship to create efficiency in handling projects, hence Östra Orgeln is not a unique project, but can instead be seen as part of a repetitive construction project with the same construction company and customer throughout a number of projects. As a consequence we reviewed the data again to search for how innovation and learning in Östra Orgeln were related to other projects. Thus, in processing the empirical data we started with the focal project and its network structure of the involved actors, resources and activities, but this led us to include how the involved actors, resources and activities of the focal project related to other projects. As industrial network theory assumes that it is the interaction between counterparts that allows renewal to take place, the identification of new *resource and activity combinations* through *actor bonds* between project actors was central to sorting and processing the collected data.

The presentation of the case study departs from the focal project *Östra Orgeln* with the aim of identifying the renewal (learning and innovation) taking place in the project and describing how renewal emerges over time by structuring the case into three sections. The first section presents renewal and the actor bonds, i.e. how actors relate to each other. The second section presents renewal and resource ties, i.e. how resources relate to each other and the third section presents renewal and activity links, i.e. how activities relate to each other. The case study ends with a table identifying learning and innovation related to each section; actor bonds, resource ties and activity links. Hence the case study should be viewed as an analysis in itself that identifies renewal and how this comes about in relation to the ARA model. In the final discussion of the paper we further discuss renewal by a discussion categorising renewal as mainly handling intra-

or inter-organisational interfaces, as well as either the intra- or the inter-project environment with help from Table 1.

## The case - renewal and Östra Orgeln

### Point of departure - the Östra Orgeln project

*Östra Orgeln* is a large housing project in the centre of Uppsala, Sweden. The cost of *Östra Orgeln* is estimated to be around 250 million SEK<sup>1</sup>. It consists of four housing blocks, two of which will be sold as tenant-owned apartments by *NCC Housing* – 102 apartments – while the other two blocks will consist of 96 rental apartments, managed by the public rental company in Uppsala, *Uppsalahem*.

We identify a set of main actors in the project. It was initiated in 2010 by *NCC Housing*, after being a land owner for more than ten years. After producing the initial programme documents in 2011 *NCC Housing* sold one part of the project (i.e. two housing bodies) to *Uppsalahem*, the public rental company in Uppsala. The internal production unit at *NCC*, *NCC Construction*, was appointed to complete the production of *Östra Orgeln*. The *NCC* production team specialised in producing rental apartments for *Uppsalahem* over the last 14 years (stretching over four prior projects). *Abetong* was appointed to provide the prefabricated frame (walls and ceilings) and thus became the largest material supplier in *Östra Orgeln*. *Bravida* was contracted to handle the installation of electricity on site, while *SydTotal* would handle the ventilation and *VVS Rör* the plumbing. The technical consultant, *Knut Jönsson*, was in charge of calculating load bearing capacity related to the drawings of the housing bodies.

We identify three main new resources in *Östra Orgeln*; an adjusted exterior wall, new bathroom modules and energy efficient solutions. The main activities related to renewal we identify are planning, production, installation, management and development activities. The next section will outline the case in terms of renewal related to actor bonds, resources ties and activities links in *Östra Orgeln* and interrelated projects, and thereby describe how renewal emerges over time. For an overview of the involved actors the following Figure 1 summarises the actors and identifies their roles.

### **Placement of Figure 1.**

### Renewal and actor bonds

*Östra Orgeln* reveals a strong actor bond between the construction company, *NCC Construction* and *Uppsalahem*. Both actors have an established relationship dating back more than 20 years. *NCC Construction* has worked closely with *Uppsalahem* on four projects prior to *Östra Orgeln*; 1) *Källsprånget* initiated in 2003 and completed in 2005, 2) *Klockarbo* the first partnering

---

<sup>1</sup> A normal-sized housing project in Uppsala is between 50-100 apartments, with a cost of between 70-100 MSEK, depending on the specific customer.

project<sup>2</sup> between NCC Construction and Uppsalahem, initiated in 2005 and completed in 2007, 3) *Fyrisvallen*, a second partnering project initiated in 2006 and completed in 2008, 4) *Mjölaren*, a third partnering project just prior to Östra Orgeln, initiated in 2007 and completed in 2010. The two parties have partnered with each other since the mid 2000s. Even though Östra Orgeln is not formally a partnering project it is described as an informal partnering project by both NCC Construction and Uppsalahem.

The strong actor bond resulted in NCC Construction establishing a production team specialised in production of rental apartments for Uppsalahem. The same site manager and main foremen were used for all 4 prior projects and Östra Orgeln. The site manager played a key role in being in charge of the whole production process during all projects. The site manager has more than 20 years' experience in this position. Consequently, the production team learned about the technical requirements of Uppsalahem along with the work processes of this key customer. NCC Construction especially emphasised the learning related to the incorporation of energy saving solutions on site.

Development of the actor bond between the two parties not only resulted in a specialised production team, it also resulted in jointly appointing suitable suppliers of the projects. As a consequence, installation companies in Östra Orgeln: *Bravida*, *Sydtotal* and *VVS Rör* were also used on previous projects. Hence, the actor bonds between the installation companies were developed throughout several projects. In *Fyrisvallen* and *Mjölaren*, Uppsalahem and NCC Construction jointly decided to include the installation companies in the partnering agreement – a unique situation for the involved actors. In several ways the actor bonds with the installation companies were important in realising renewal in Östra Orgeln. For instance, *Bravida* was important in specifying the precise location of electricity sockets for the new bathroom modules along with solving installation of individual water and electricity measurements and LED lighting. *SydTotal* suggested a new way of heating the basement, by redirecting warm air from the apartments to the basement, which had only been used in one previous project. Moreover, *Sydtotal* installed ozone cleaning in the garbage room, which decreased the energy consumption for the whole project. NCC Construction interacted with the installation companies to continuously improve work processes on site. Due to the established actor bond with installation companies the same installation companies were appointed for the subsequent *Västra Orgeln* project. It is the same as with the installation company, *Knut Jönsson*, who was present on all four Uppsalahem projects prior to Östra Orgeln and on *Västra Orgeln*. NCC Construction has had an established actor bond with *Knut Jönsson* for the last 30 years.

Östra Orgeln also displays another actor bond involving *NCC Construction* and *NCC Housing*. The company is the internal housing unit within NCC specialising in developing land into housing to be sold as tenant-owned apartments. To share a project between two customers, representing both owner-occupied and rental apartments, as in Östra Orgeln, was not only new to NCC Housing but also to Uppsalahem. The idea of selling one part of the project to a rental company came from an internal NCC Housing project in Linköping. Even though an actor bond existed between NCC Housing and NCC Construction, the production team specialised in the

---

<sup>2</sup> A partnering project is a new type of relational contractual agreement.

production of rental apartments were not used to working with NCC Housing. Instead, the production team was selected for their experience with rental apartments. NCC Housing saw the possibility of learning from the construction of rental apartments and, therefore, sold the second part of the project to Uppsalahem. As a consequence NCC Housing selected the specialised production team to set up the buildings. Furthermore, to increase efficiency across projects the same production team from NCC Construction was also appointed for Västra Orgeln where NCC Housing was the sole customer. A new actor bond between *NCC Housing* and *Uppsalahem* was established in Östra Orgeln. Through joint construction meetings and through the ‘intermediary’ unit, NCC Construction, a learning experience was created between the two parties. However, it was mainly NCC Housing that picked up new ways of thinking from Uppsalahem rather than the other way around. Setting up and managing rental apartments is quite different from setting up buildings with the aim of selling them. As a rental management company, Uppsalahem is focused on the long-term management of buildings (up to 50 years) which means a focus on minimising the long-term fixed costs. These demands put special requirements on the buildings such as minimising the secondary area (i.e. the area that does not generate rent) along with emphasising solutions for energy efficiency. NCC Housing in Östra Orgeln especially embraced new energy efficiency solutions. By reducing long-term fixed costs NCC Housing could set a higher price for each apartment.

*Abetong* is the largest supplier of the framework (walls and ceilings) in Östra Orgeln. The actor bond between *NCC Construction* and *Abetong* was established more than 15 years ago and the company supplied frames to all projects prior to Östra Orgeln, and is also appointed to supply the framework for Västra Orgeln. The actor bond was established in the late 1990s, when NCC Construction tried out *Abetong*’s prefabricated walls, a successful trial done by the same production team and site manager as that of Östra Orgeln. In the following projects NCC Construction tried out and used more of the pre-conformed systems.<sup>3</sup> In Östra Orgeln, *Abetong* supplied a new bathroom module and an exterior wall developed in cooperation with NCC Construction stretching back several projects. The new development was only possible due to the established actor bond between the production team of NCC Construction and *Abetong*. In initiating new development of bathroom modules, *Abetong* especially emphasised the expertise of the production team.

### Renewal and resources ties

The case displays several resource ties in Östra Orgeln that were developed over time and in several projects. *An adjusted exterior wall* was used in the project. The wall was originally developed by *Abetong* due to new requirements by Stockholm municipality to forbid visible joints on exterior walls. The wall was developed to be able to plastered on site and included more insulation along with non-organic materials, resulting in an energy efficient wall. The new wall was used in both Fyrisvallen and Mjölaren, and was further developed in Östra Orgeln along with the subsequent project Västra Orgeln. Hence, further development of the exterior wall was possible due to positive experiences and cooperation between *Abetong* and NCC Construction throughout several projects. By initiating a new exterior wall through these

---

<sup>3</sup> The pre-conformed system refers to a system where the cast is prefabricated, while the inner walls are cast on-site.

projects the production team at NCC Construction could optimise the production and suggest necessary alterations to Abetong<sup>4</sup>. More importantly, the exterior wall supplied by Abetong was important for the main (physical) innovation taking place in Östra Orgeln – the initiation of *new bathroom modules*. This solution can be traced back to the previous project, Mjölaren, in which Uppsalahem requested non-organic bathroom walls. In developing non-organic walls Abetong departed from the exterior wall used earlier; however, for Mjölaren Abetong did not finish the development and hence NCC Construction had to manually set up the non-organic walls on-site, a time-consuming solution. For Östra Orgeln, NCC Construction wanted to facilitate the construction on-site (time and space) and requested Abetong to jointly develop a bathroom module for subsequent projects. Other customers had asked Abetong to develop bathroom modules before, but it was not until NCC Construction and its specialised production team that Abetong decided to develop the module in collaboration with NCC Construction. Hence the new bathroom module became a reality in Östra Orgeln. The main challenge for Abetong in developing the bathroom walls into construction elements was the reduction of the thickness, from 120 or 150mm (the normal thickness of an exterior wall) to 96mm. To create a lighter and thinner version of the exterior wall, Abetong needed to adjust the concrete content. As the ballast was too heavy, it was replaced by LECA pellets (Lightweight Concrete Aggregates), sand and cement. As a result, the wall became more than 50% lighter and thus could be easily lifted on site without affecting the load capacity.

Östra Orgeln displays the incorporation of *several energy efficiency solutions*. Individual measures for water and electricity measurements, LED lighting, and heating the basement with ventilation from the attic were energy saving solutions incorporated in the buildings. However, energy saving solutions were largely standard technical solutions for the rental company Uppsalahem, while NCC Housing had never used them prior to Östra Orgeln. In solving individual measurements of water and electricity, NCC Housing and Uppsalahem used different systems, whereas NCC Housing used a new wireless system which meant some problems on site in installing more individual measure boxes. To provide an energy declaration and to be able to obtain the right data from the wireless system, NCC Housing used *NCC Teknik*, an internal specialised unit in Gothenburg, as the energy expert. Uppsalahem mainly pushed for incorporating energy-saving solutions while NCC Housing pushed for the use of VDC and 3D-BIM<sup>5</sup> with the aim of decreasing on-site adaptations, something that was totally new for Uppsalahem.

### Renewal and activity links

The renewal taking place in Östra Orgeln and interrelated projects is affected by how activities are linked over time. *Production activities* seem to be especially linked in different ways, over several projects. To begin with, the site manager of NCC Construction joined the planning organisation in all 4 projects prior to Östra Orgeln along with the subsequent project Västra Orgeln. As a result, the site manager of Östra Orgeln attended all the planning meetings to

---

<sup>4</sup>The exterior wall was new to NCC Housing in Östra Orgeln but not to Uppsalahem and NCC Construction.

<sup>5</sup> VDC stands for Virtual Design and Construction - a way of handling information throughout the construction process by using Building Information Modeling (BIM) - i.e. building information and characteristics that are related to specific building objects in the building. BIM can be used for visualizations from a 3D perspective.



provide production expertise and was a key individual in making the planning documents as ‘producible’ as possible. Moreover, using VDC tools for coordination of the planning activities was also an attempt to achieve more efficient production activities by reducing on-site adaptations. In addition, the set-up of *planning and production activities* is systematically organised across projects, while one project is in the production phase the planning activities of the next project are initiated. By doing this the production team and planning organisations overlap and are used efficiently across parallel projects.

The case also displays linking *development and production activities* tighter together. The development of the new bathroom module in Östra Orgeln was a request due to the difficulties of establishing efficient production activities in Mjölaren where NCC Construction had to manually mortar the walls. While the development activities of the new bathroom modules not only resulted in affecting production activities on site, it also resulted in adapting the production activities at Abetong’s factory producing the modules. Production in the factory was further adjusted in the subsequent project, Västra Orgeln.

The case also displays how *property management activities and production activities are linked*, and it is shown how the two customers in Östra Orgeln, Uppsalahem and NCC Housing have different ways of managing construction and managing the buildings. The two companies have different timeframes for their management activities – NCC Housing has a short-term perspective with little attention to long-term costs, while Uppsalahem has a long-term perspective. NCC Housing is keen on learning more about rental management and how these requirements are manifested in the buildings. As a consequence, the choice of energy saving solutions is a result of the requirements from Uppsalahem, which affects *production and installation activities* on site. In the following Table 2 we summarise the renewal of actor bonds, resource ties and activity links related to the focal Östra Orgeln project.

### ***Placement of Table 2.***

## **Discussion**

The case description of Östra Orgeln reveals that the project takes place within a more or less established structure of actors with a relatively common history. There are individuals belonging to different actors having personal experience with each other, there are activities both within and between actors, and different types of physical and organisational resources that were used together in earlier projects. In this total structure there already are a number of renewal processes affecting intra- as well as inter-organisational issues. The examples of renewal that we could find within the project were all parts of an inter-project environment in which particular resource and activity combinations were both used and developed across several projects. These combinations represent both intra-organisational relationships within the focal company, NCC, and inter-organisational relationships between NCC and other actors. We will use the earlier identified four-cell matrix (Table 1) to identify important ingredients in

how NCC tries to be an active participant in the total renewal process. The main findings are summarised in Table 3, where the four different types of managerial activities dealing with renewal are described from the standpoint of the construction company, NCC, in the Östra Orgeln project.

### ***Placement of Table 3.***

If we start with cell number 1, which refers to intra-organisational relationships within NCC and the focal project, Östra Orgeln, we can see that the whole team's composition, including the choice of site manager, is a very conscious way of utilising what has been achieved in earlier projects. This is emphasised by the site manager, when he says:

*“We are trying to make the projects overlap and never totally stop. Instead, we are striving to use the resources as best as we can, then we will get a good profit...It is our goal to move the organisation between workplaces.”*

Hence, in order to create efficient planning and production activities, ties and links from earlier investments were used internally in NCC. The company fully realised the importance of utilising both its own experience with and investment in links, ties and bonds. But there are also some attempts to create change – creating new links, ties and bonds by involving new internal personnel. For example, it was the first time the experienced NCC production team produced for an internal customer, NCC Housing. Furthermore, to be able to install new wireless individual readers and supply a sufficient energy declaration, for the first time the NCC production team needed to use the knowledge of the internal energy experts at NCC Teknik. Hence this reflects the possibility for a large company such as NCC to use internal units to change the use of resources in solving both planning and production activities. Thus, management includes both creation and utilisation of earlier links, ties and bonds as well as creating new ones by combining earlier experiences in new ways.

Continuing with the cell number 2 regarding inter-organisational relationships within Östra Orgeln, we see that NCC used the relationship with the architect and installation companies to supply 3D drawings. The aim was to facilitate the links between the actors in planning activities, and to avoid any discrepancy between the building documents and the actual production, thereby creating a more efficient construction process, i.e. better linking production activities. Moreover, the NCC production team normally handles construction projects related to Uppsalahem but, for Östra Orgeln, the NCC production team needed to engage in coordinating activities involving two customers and thus two different relationships (however, using knowledge we gained through studies of other projects suggests that it is Uppsalahem that is mostly driving renewal issues). To create efficient production activities on-site, the NCC production team mobilised links and ties from the established relationship with the frame supplier to supply the bathroom as construction elements. Moreover, to further facilitate production activities, it also requested a development of a new tie through an adjustment of the exterior wall supplied by the frame supplier (however, this was indirectly linked to experiences from previous Uppsalahem projects, which are further discussed in relation to the inter-

project/inter-organisational cell of the matrix). The development of this tie – the adjustments of bathroom walls and exterior walls – required development activities at the frame supplier.

Cell number 3 concerns how Östra Orgeln is related to intra-organisational relationships within NCC, stretching across several projects. First, NCC Housing included a second customer (Uppsalahem) in Östra Orgeln due to another internal NCC reference project in Linköping. By creating ties to this highly specialised rental customer, NCC Housing saw the possibility of learning to become a better (more demanding) customer. In terms of organising the production activities in Östra Orgeln, NCC's organisation and composition of the production team was important in implementing renewal. Here, as was illustrated by the case, NCC purposely organised a specific internal production team to develop bonds to a specific large customer, Uppsalahem. For all Uppsalahem projects (Källsprånget, Klockarbo, Fyrisvallen, Mjölaren and Östra Orgeln), NCC provided the same production team and site manager and used the knowledge as well as links and ties throughout a series of projects to improve efficiency and take advantage of learning across projects. To further facilitate production activities, it appears quite clearly that NCC Construction organised the different projects so that the planning and production of the different projects would overlap. The experience and knowledge together with links and ties gained by the NCC production team from earlier Uppsalahem projects is not only used for Uppsalahem but, in Östra Orgeln it was also diffused to the internal NCC customer, NCC Housing, and further used in the subsequent Västra Orgeln project (the first project in which the NCC production team is producing only for NCC Housing). Östra Orgeln and Västra Orgeln are thus highly interrelated in terms of how they are embedded into the total renewal process, as the NCC production team continues to use resources from Östra Orgeln in Västra Orgeln (individual measurements for water and electricity, a new exterior wall, LED lighting, etc).

Cell number 4 shows how Östra Orgeln relates to NCC's inter-organisational relationships that stretch across several projects. Here, NCC developed links and ties with the frame supplier (Abetong) in several projects by making adjustments to the new exterior wall which require development activities stretching across projects. Moreover, NCC Construction also used the bonds with the frame supplier to engage the latter in developing activities regarding a new non-organic bathroom wall due to the request from Uppsalahem in Mjölaren. The new wall affected the production activities for the NCC production team but also linked them to the production activities of the frame supplier in the factory. Several inter-organisational relationships were important ingredients in the renewal process affecting Östra Orgeln. However, the most important of these was the relationship between NCC Construction and Uppsalahem; here, the NCC production team played a major role in linking the production activities necessary for realising the construction of several Uppsalahem projects. The relationship and its links and ties developed over time, and in some projects manifested in partnering agreements between NCC and Uppsalahem – a contract that presupposes close collaboration. All Uppsalahem projects are embedded into the same core network, including Uppsalahem, the NCC production team, installation companies, and the frame supplier, along with the technical building consultant. By activating this basic network, NCC believes that it achieves a greater overall efficiency across projects. Also, for Västra Orgeln, NCC uses the same basic network to facilitate planning and production activities. By using the same network,

the solution developed for Uppsalahem could also be implemented in this NCC Housing project.

## Conclusions

Developing and connecting relationships in order to influence and become part of the total renewal process in a network is somewhat difficult given the context of the network (how the commercial relationships are embedded into legal, social and institutional dimensions). The context includes weaker or stronger inter-organisational processes supporting or hindering the development of connected relationships. The construction industry is characterised by three such processes. Two processes hinder continuity and stable partners – the focus on single projects and the tendering mechanism – while the third process encourages specialisation among suppliers, which calls for the importance of relating to a variety of actors.

We described and analysed how a construction company in a single project tries to be an active partner in the total renewal process. Despite the fact that the two processes making it more difficult are at hand – there is a focus on the single project and the use of the short term tendering process – the company is part of a number of specific activities and processes where specific ties and links are formed and utilised. Under the surface of a ‘market’ a network-like structure exists where personal bonds, specific resource ties and activity links are connected across project and organisational boundaries. In this case, renewal is created through the development of *interdependencies* between the ‘internal’ and ‘external’ conditions of both the single project and the focal company, thus connecting the project and the firm to a greater inter-organisational context that can be referred to as its milieu (Cova et al., 1996). In the following sections, we emphasise four main management issues in relation to handling such interdependencies.

First, project management is mainly incremental in the sense that the activities being conducted are largely modifications of existing solutions. As we see in the case, many of the development processes started in earlier projects and kept evolving through the engagement of both established and new actors in the individual projects. In line with several scholars such as Engwall and Jerbrant (2003), Brady and Davies (2004) and Hartmann and Dorée (2015), what was developed in the case internally cannot be either identified or understood in isolation; a project has to be seen in the historical context of earlier projects, ‘external’ to the individual project. It is also an effect of the types of solutions the different actors have experienced or developed separately ‘outside’ the individual project, and how they can combine these solutions in a novel way to succeed with the current project. Hence, the results point out that management is in many ways based on time; it is taking advantage of minor adjustments over time rather than relying on new brave decisions.

Secondly, as supported by Dubois and Gadde (2003), the case reveals that management is based on interaction among a variety of actors. Each project will engage both established and new actors; what are seen as new activities to some of the actors can appear as standard implementations to others. Hence, even though the case takes place within a business context dominated by fragmenting processes, more long-term threads are developed among the participating actors and act as an important basic condition for management even across

projects. This is clearly in line with the industrial network approach. Moreover, this 'light' type of network of relationships is open to new actors. Management includes the creation and handling of new solutions in the individual project through connecting to other projects. They will represent something new to those actors that have not engaged in earlier projects; the constant introduction of new actors will bring both a certain dynamic and inertia to management processes in projects where both established and new actors can either learn from each other or block each other from learning. Both these aspects of how management is played out have implications for how innovation and renewal should be viewed and valued in the construction industry. As renewal happens incrementally, interactively and through 'ordinary' ways of working, innovation will not appear in a revolutionary or obvious way, and consequently it is hard to identify and measure. However, it is clear that these renewal processes have obvious effects for the actors involved and, as such, should be considered as innovative behaviour, especially in relation to organisational resources. By adopting an industrial network approach on the study of project businesses, the 'hidden' network processes stretching across several actors and projects could be revealed. To further reveal these processes we urge other scholars to investigate projects as the result of a network of relationships stretching across several projects.

Thirdly, the case study indicates that the focal company could use and combine its internal resources and units in a systematic way across projects; a possibility due to the company being part of a large construction company. The focal company found a way to manage its multi-project business by overlapping the planning and production of separate projects as a way of using resources more efficiently. Moreover, these internal processes were connected to a set of other actors including single individuals on both the supply and customer sides respectively. The continuing collaboration across projects formed a 'core network of individuals and organisations' that facilitated the management of renewal of actor bonds, resource ties and activity links. This demonstrates that intra-organisational and inter-organisational processes can be combined for the purpose of reusing, which was achieved in earlier projects, both in terms of learning and new innovations. This means that renewal takes place both *within* and *between* different projects, and that a recurring project organisation facilitates the development and spread of learning across projects. This will not happen by itself but is directed and steered by a systematic management effort by the involved organisations. However, it is important to understand that it is impossible for the involved organisations to have full control and insights on what is going on in several projects as suggested by Tikkanen et al. (2007). Still our study shows that management have an important role to play in systematically handle renewal across projects.

Fourthly, it is also the case that the focal company wanted to create a repetitive type of project task, which was facilitated by the fact that the construction object was more or less the same since it concerned equally sized apartment blocks. As stated by Lundin and Söderholm (1995), this may facilitate the forming of a repetitive type of organisation around similar project tasks. Our case study demonstrates that this way of interacting across projects was consciously adopted by the individual actors as a way of making the planning and production activities more efficient. Construction companies, which organise all production activities in projects, can thus seek ways of creating a more consistent and efficient type of production process, which, as we

can see, also enables long-term renewal. This implies that, instead of just adapting temporarily to completely new actor constellations in each single project (which is the traditional and possibly dominant way of working in the construction industry) the use of a recurring project organisation, in combination with the introduction of new actors, enables the company to be an active part in the total renewal process.

In viewing the project as a result of a network of relationships stretching across several projects, further empirical research into how construction companies attempt to manage renewal over time could be pursued in several ways. One study would be the investigation of how a repetitive type of project organisation is connected to the project task (repetitive vs. unique). Another suggestion for a future study would be how actors can or cannot use what they have learnt within a repetitive project organisation in other actor constellations - are there some aspects of the learning that can be used, and if so, in what ways? By tracing specific resource combinations and activity links developed across projects with a repetitive project organisation, it becomes feasible to identify how they can or cannot be utilised in other projects not consisting of the repetitive project organisation. This would overcome a limitation of this study, which is that we followed one repetitive project organisation as long as it stays intact. However, this has proven to be valuable for gaining several insights into the managerial issues of handling renewal in a business context characterised by fragmentation and discontinuity.

## References

- Abrahamsen, M., Håkansson, H. (2012), “Networks in transition”, *The IMP Journal*, Vol. 7 No. 3, pp. 194-209.
- Araujo, L., Dubois, A. and Gadde, L.-E. (2003), “The multiple boundaries of the firm”, *Journal of Management Studies*, Vol. 40 No. 3, pp. 1255-77.
- Ayas, K. and N. Zeniuk (2001), “Project-based learning: Building communities of reflective practitioners”, *Management Learning*, Vol. 32 No. 1, pp. 61-76.
- Baraldi, E. (2003), *When Information Technology Faces Resource Interaction Using IT tools to Handel Products at IKEA and Edsbyn*, doctoral thesis, Uppsala University.
- Braun, T., Müller-Seitz, G., and Sydow, J. (2012), “Project citizenship behaviour? –An explorative analysis at the project-network nexus”, *Scandinavian Journal of Management*, Vol. 28 No.4, pp. 271-284.
- Brady, T. and Davies, A. (2004), “Building project capabilities, from exploratory to exploitative learning”, *Organization Studies*, Vol. 29 No. 9, pp. 1601-1621.
- Brekke, A. (2009) *A bumper! An empirical investigation of the relationship between the economy and the environment*, doctoral thesis, BI Norwegian Business School, Oslo.
- Bresnen, M., Goussevskaia, A., and Swan, J. (2004), “Embedding new management knowledge in project-based organisations”, *Organization Studies*, Vol. 25 No. 9, pp.1535-1555.
- Bygballe, L., Jahre, M., and Swärd, A. (2010), “Partnering relationships in construction: a literature review”, *Journal of Purchasing and Supply Management*, Vol. 16 No. 4, pp. 239-253.
- Cantillon, S. (2010), *The complexity of actor interaction*, doctoral thesis, Norwegian University of Science and Technology, Trondheim ([www.impgroup.org](http://www.impgroup.org)).
- Cova, B., Mazet, F., and Salle, R., (1996), “Milieu as a pertinent unit of analysis in project marketing”, *International Business Review*, Vol. 5 No. 6, pp. 647–664.
- Cova, B. and Salle, R. (2007), “Introduction to the IMM special issue on ‘Project marketing and the marketing of solutions’ a comprehensive approach to project marketing and the marketing of solutions”, *Industrial Marketing Management*, Vol. 36 No. 2, pp. 138–146.
- Crespin-Mazet, F., Havenvid, M.I. and Linné, Å. (2015), “Antecedents of project partnering in the construction industry –the impact of relationship history”, *Industrial Marketing Management*, Vol. 50 October, pp. 4-15.
- Dainty, A., Briscoe, G. and Millet, S. (2001), “New perspectives on construction supply chain integration”, *Supply Chain Management: An International Journal*, Vol. 6 No. 4, pp. 163–73.

- Davies, A. and Hobday, M (2005). *The business of projects: managing innovation in complex products and systems*, Cambridge University Press: Cambridge.
- Dorée, A. G. and Holmen, E. (2004) “Achieving the unlikely: Innovating in the loosely coupled construction system”, *Construction Management and Economics*, Vol. 22 No. 8, pp. 827.
- Dosi, G. (1982), “Technological paradigms and technological trajectories”, *Research Policy*, Vol. 11 No. 3, pp. 147-162.
- Dubois, A., 1998, *Organising industrial activities across firm boundaries*. Routledge, London.
- Dubois, A. and Araujo, L. (2007), “Case research in purchasing and supply management: Opportunity and Challenges”, *Journal of Purchasing and Supply Management*, Vol. 13 No. 3, pp. 170-181.
- Dubois, A. and Gadde, L-E. (2002), “The construction industry as a loosely coupled system: implications for productivity and innovation”, *Construction Management and Economics*, Vol. 20 No. 7, pp. 621-632.
- Eisenhardt, K. (1989), “Building Theories from Case Study Research”, *Academy of Management Review*, Vol. 14 No. 4, pp. 532-550.
- Engwall, M. and Jerbrant, A. (2003), “The Resource Allocation Syndrome: The Prime Challenge of Multi-Project Management?”, *International Journal of Project Management*, Vol. 21 No. 6, pp. 403.
- Fagerberg, J. (2004) “Innovation -a guide to the literature”, In Fagerberg, J., Mowery, D. and Nelson, R. (Eds.) *Handbook of Innovation*, Oxford University Press, New York, pp. 1–26.
- Fredriksson, P. (2006), “Cooperation and conflict in modular production and supplier parks”, *International Journal of Automotive Technology and Management*, Vol. 6 No. 3, pp. 298-314.
- Gadde, L-E. and Jellbo, O. (2002), “System sourcing – opportunities and problems”, *European Journal of Purchasing and Supply Management*, Vol. 8 No. 1, pp. 43-51.
- Gadde, L-E. and Dubois (2010), “Partnering in the construction industry- problems and opportunities”, *Journal of Purchasing and Supply Management*, Vol. 16 No. 4, pp. 254-263.
- Gadde, L.-E. and Håkansson, H. (1998), *Professionellt inköp*, Studentlitteratur, Lund.
- Gadde, L.-E. and Håkansson, H. (2008), “Business relationships and resource combining”, *The IMP Journal*, Vol. 2 No. 1, pp. 31-45.
- Gann, D.M. and Salter, A. J. (2000), “Innovation in project-based, service-enhanced firms: the construction of complex products and systems”, *Research Policy*, Vol. 29 No. 7-8, pp. 955-972.
- Grabher, G. (2004), “Temporary architectures of learning: knowledge governance in project ecologies”, *Organization Studies*, Vol. 25 No. 9, pp. 1491-1514.



- Hadjikhani, A., (1996), "Project marketing and management of discontinuity", *International Business Review*, Vol. 5 No. 3, pp. 319-337.
- Havenvid, M.I., Håkansson, H., and Linné, Å., "Economic deals in the construction industry – implications for socio-material interaction and monetary processes", *The IMP Journal*, forthcoming 2015.
- Håkansson, H. (1982), *International Marketing and Purchasing of Industrial Goods: An Interaction Approach*, John Wiley and Sons, Chichester.
- Håkansson, H., (1990), "Technological Collaboration in Industrial Networks", *European Management Journal*, Vol. 8 No. 3, pp 371-379.
- Håkansson, H., (1994), Networks as a mechanism to develop resources, in Beije et al. (eds.) *Networking in Dutch Industries*, Garant Uitgivers.
- Håkansson H., Ford D., Gadde L-E., Snehota I., and Waluszewski A. (2009) *Business in Networks*, John Wiley and Sons, Sussex, UK.
- Håkansson, H. and Ingemansson, M. (2011), "Construction companies and how they acquire knowledge through business interaction", *The IMP Journal*, Vol. 5 No. 2, pp. 67-78.
- Håkansson, H. and Ingemansson, M. (2013), "Industrial renewal within the construction network", *Construction Management and Economics*, Vol. 31 No. 1, pp. 40-61.
- Håkansson, H. and Johanson, J. (1992), "A model of industrial networks", In Axelsson, B. and Easton, G. (eds.) *Industrial Networks: A New View of Reality*, pp. 28–34, Routledge, London.
- Håkansson, H. and Johanson, J. (2001), *Business Network Learning*, Pergamon, Amsterdam.
- Håkansson, H., and Lind, J., (2004), "Accounting and network coordination", *Accounting, Organization and Society*, Vol. 29 No. 1, pp 51-72.
- Håkansson, H. and Prenekert, F. (2004) "Exploring the exchange concept in marketing", In Håkansson, H., Harrison, D., Waluszewski, A. (eds.), *Rethinking Marketing: developing a new understanding of markets*, Wiley, Chichester.
- Håkansson, H. and Snehota I. (1995), *Developing Relationships in Business Networks*, Routledge, London.
- Håkansson, H. and Waluszewski, A. (2002), *Managing Technological Development*, Routledge, London.
- Håkansson, H. and Waluszewski, A., eds. (2007), *Knowledge and Innovation in Business and Industry –The importance of using others*, Routledge, London.
- Harrison, D. and Waluszewski, A. (2008), "The development of a user-network as a way to re-launch an unwanted product", *Research Policy*, Vol. 37 No. 1, pp. 115-130.

- Hartmann, A. and Dorée, A. (2015), “Learning between projects: More than sending messages in bottles”, *International journal of project management*, Vol. 33 No. 2, pp. 341-351.
- Von Hippel, E. (1998), “Economics of product development by users: the impact of “sticky” local information”, *Management Science*, Vol. 44 No. 5, pp. 629-44.
- Hobday, M. (2000), “The project-based organisation: an ideal form for managing complex products and systems?”, *Research Policy*, Vol. 29 No. 7-8, pp. 871-893.
- Henders, B. (1992), *Position in industrial networks: marketing newsprint in the UK*, doctoral thesis, Uppsala University.
- Hoholm, T. (2011) *The contrary forces of innovation: An ethnography of innovation in the food industry*. Palgrave Macmillan, London.
- Holmen, E., (2001) *Notes on a conceptualisation of resource-related embeddedness of interorganizational product development*, doctoral thesis, University of southern Denmark.
- Holmen, E., Pedersen, A-C., and Torvatn, T. (2005), “Building relationships for technological innovation”, *Journal of Business Research*, Vol. 58 No. 9, pp. 1240-1250.
- Ingemansson, M. (2010), *Success as Science but Burden for Business? – On the Difficult Relationship between Scientific Advancement and Innovation*, doctoral Thesis, Uppsala University.
- Jahre, M., Gadde, L.-E., Håkansson, H., Harrison, D., and Persson, G. (eds.) (2006), *Resourcing in business logistics. The art of systematic combining*, Liber and Copenhagen Business School Press, Copenhagen.
- Jones, C. and Lichtenstein, B.B. (2008), Temporary inter-organizational projects: how temporal and social embeddedness enhance coordination and manage uncertainty, In Cropper, S., Ebers, M., Ring, P.S. and Huxham, C., (eds.), *Handbook of Inter-organizational Relations*, pp.231-255, Oxford University Press, London.
- Keegan, A. and Turner, R (2002), “The management of innovation in project-based firms”, *Long Range Planning*, Vol. 35 No. 4, pp. 367–388.
- Laage-Hellman, J. (1997), *Business networks in Japan: Supplier-customer interaction in product development*, Routledge, London.
- Linné, Å. (2012), *China's Creation of Biopharmaceutical Drugs: Combining Political Steering, Military Research, and Transnational Networking*, doctoral thesis, Uppsala University.
- Lundgren, A. (1994), *Technological innovation and network evolution*. Routledge, London.
- Lundin, R. and Söderholm, A. (1995), “A theory of the temporary organization”, *Scandinavian Journal of Management*, Vol. 11 No. 4, pp. 437-455.
- Manning, S. and Sydow, J. (2011), “Projects, paths and practices: sustaining and leveraging project-based relationships”, *Industrial and Corporate Change*, Vol. 20 No. 5, pp. 1369-1402.

Ministry of Finance (SFD) (2009), “Sega gubbar? En uppföljning av Bygghandläggningens betänkande ‘Skärpning gubbar!’”, Public investigation by the Swedish Government, SFD no. 6.

Ministry of Social Affairs (SoU) (2002), “Skärpning gubbar! Om konkurrensen, kvaliteten, kostnaderna och kompetensen i byggsektorn”, Public investigation by the Swedish Government, SoU no. 115.

Miozzo, M. and Dewick, P. (2004), *Innovation in Construction. A European Analysis*, Edward Elgar Publishing Ltd., Cheltenham.

Olsen, P. I. (2012), “Below the surface: How (seafood-) networks work – and how they change”, *The IMP Journal*, Vol. 7 No. 3, pp 186-93.

Nobeoka, K. (1995), “Inter-project learning in new product development”, *Academy of Management Journal*, Vol. 38 No. 4, pp 432-436.

Packendorff, J. (1995), “Inquiring into the temporary organization: new directions for project management research”, *Scandinavian Journal of Management*, Vol. 11 No.4, pp. 319-333.

Principe, A. and Tell, F. (2001), “Inter-project learning: processes and outcomes of knowledge codification in project-based firms”, *Research Policy*, Vol. 30 No. 9, pp. 1373–94.

Scarborough, H., Swan, J., Laurent, S., Bresnen, M., Edelman, L., and Newell, S. (2004), “Project-based learning and the role of learning boundaries”, *Organization Studies*, Vol. 25 No. 9, pp. 1579-1600.

Skaates, M. A., and Tikkanen, H. (2003), “International project marketing: An introduction to the INMP approach”, *International Journal of Project Management*, Vol. 21 No. 1, pp. 503–510.

Slaughter, S. (1993), “Builders as sources of construction innovation”, *Journal of Construction Engineering and Management*, Vol. 119 No. 3, pp. 532-549.

Swan, J., Scarborough, H. and Newell, S. (2010), “Why don't (or do) organizations learn from projects?”, *Management Learning*, Vol. 41 No. 3, pp. 325–344.

Söderlund, J. (2004), “Building theories of project management: past research, questions for the future”, *International Journal of Project Management*, Vol. 22 No. 3, pp.183-191.

Tennant, S. and Fernie, S. (2014), “Theory to practice. A typology of supply chain management in construction”, *International Journal of Construction Management*, Vol. 14 No. 1, pp. 56-66.

Tikkanen, H., Kujala, J., and Artto, K., (2007), “The marketing strategy of a project-based firm: the four portfolios framework”, *Industrial Marketing Management*, Vol. 36 No. 2, pp. 194-205.

Waluszewski, A. (1989), *Framväxten av en ny massateknik: en utvecklingshistoria* (The development of a new mechanical pulping technique) doctoral thesis, Acta Universitatis Upsalienses – Studia Oeconomia Negotiorum 31. Almqvist and Wiksell, Uppsala.

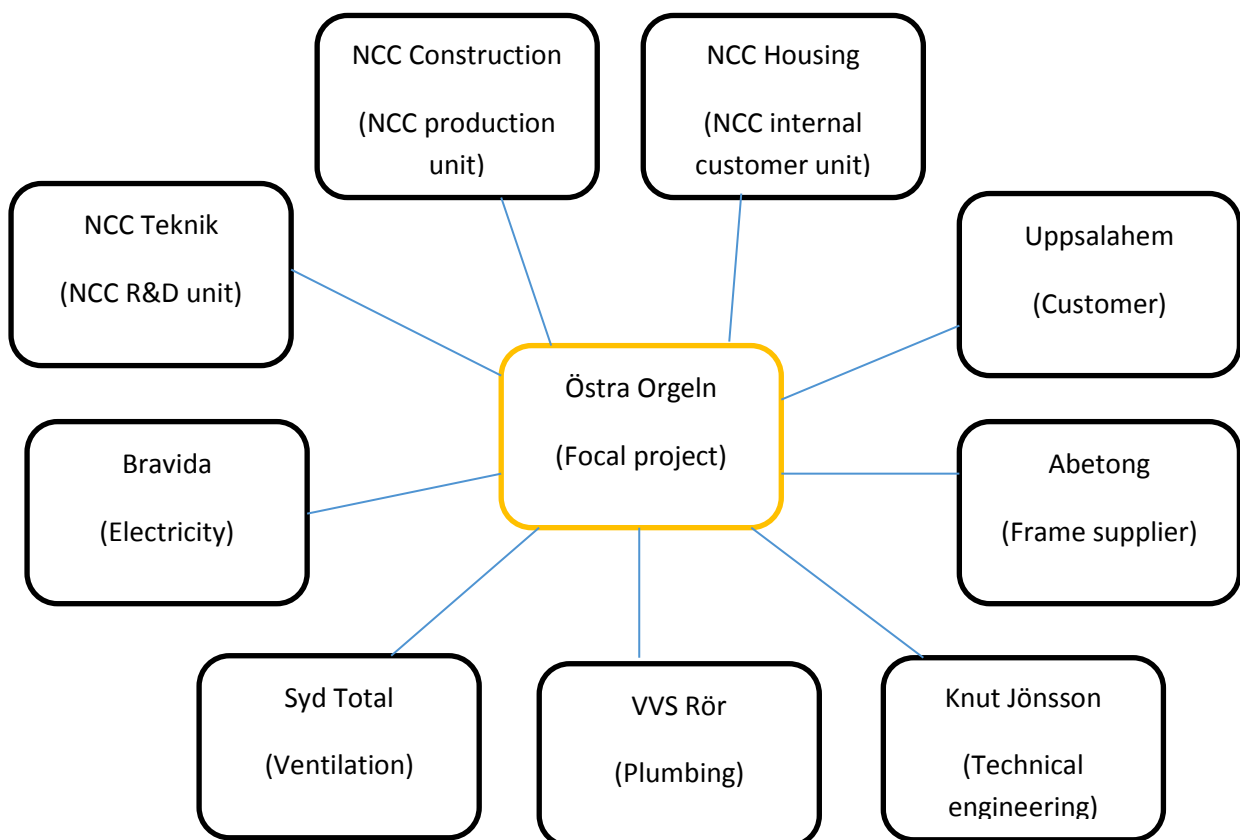
Waluszewski, A. (2004) How social science is coloured by its research tools or What's behind the different interpretations of a growing "biotech valley?., In Grandin, Wormbs, Widmalm (eds.), "Science and Industry Nexus, History, Policy, Implications", pp. 93-118, Science and History Publications, USA.

Winch, G. (1998), "Zephyrs of creative destruction: understanding the management of innovation in construction", *Building Research and Information*, Vol. 26 No. 4, pp. 268-279.

Winch, G.M. (2003), "Models of manufacturing and the construction process: the genesis of re-engineering construction", *Building Research and Information*, Vol. 31 No. 2, pp. 107-118.

Yin, R. (1994), *Case Study Research: Design and Methods* (2<sup>nd</sup> edition), Sage Publications, Beverly Hills.

Figure 1. Actors involved in the Östra Orgeln project.



*Company*

	Intra-organisational	Inter-organisational
<i>Project</i>	<b>Cell 1</b>	<b>Cell 2</b>
	To what degree is the composition of the <i>internal</i> team related to renewal of resources and activities?	To what degree is the <i>collaboration with others</i> done in order to create and/or adapt to renewal of resources and activities?
	<b>Cell 3</b>	<b>Cell 4</b>
Inter-project	To what degree are <i>internal</i> investments or renewals in resources and activities made in earlier or current projects being mobilised?	To what degree are specific investments or renewals in resources and activities made <i>by others</i> in earlier or current projects being mobilised?

**Table 1.** Four organisational issues for construction companies to manage in relation to renewal within and across projects.

Renewal and actor bonds	Renewal and resource ties	Renewal and activity links
<p><i>Bond between NCC – Uppsalahem</i></p> <p>-Partnering and cooperating relationship, new innovations throughout several projects (5 projects)</p> <p>- learning concerning technical requirements of Uppsalahem through several projects</p> <p>-Learning results in using the same production team for several projects</p>	<p><i>Ties and an exterior wall</i></p> <p>-The wall is a new innovation that has been adjusted during 3 projects</p>	<p><i>Links between production activities</i></p> <p>-The same production team creates learning of production activities across projects</p>
<p><i>Bond between NCC-Uppsalahem-Installation companies</i></p>	<p><i>Ties and the bathroom modules</i></p>	<p><i>Links between planning and production</i></p>

- Creates learning concerning technical requirements of Uppsalahem and improving on-site work processes	-The module of a new innovation combined with features from the exterior wall into new bathroom wall into a new module  -Experiences from earlier project results in learning and adjustments in ÖO	-VDC tools link planning and production activities  -Overlapping planning and production creates learning between projects
<i>Bond between NCC-NCC Housing</i>  -Creates learning concerning technical requirements of NCC Housing	<i>Ties and energy solutions</i>  -New wireless measure of individual water/electricity is a new innovation	<i>Links between development and production activities</i>  -The new bathroom module in order to facilitate production activities on site-creates innovation  -Production activities on site are related to production activities in factory which creates learning
<i>Bond between NCC Housing - Uppsalahem</i>  -Creates learning how to build in energy efficient and cost efficient manner		<i>Links between property management activities and production activities</i>  -Learning between NCC Housing and Uppsalahem related to management activities  -Management activities create links to production and installation activities
<i>Bond between NCC-A-Betong</i>  -Creates learning in how to adjust Abetong's products		

Table 2. Identifying renewal in relation to actor bonds, resource ties and activity links in Östra Orgeln.

	<b>Intra-organisational (NCC)</b>	<b>Inter-organisational (NCC-others)</b>
<b>Intra-project (Östra Orgeln)</b>	<b>Cell 1</b>	<b>Cell 2</b>

	<p>-The choice of site manager and production team was highly influenced by the ambition to utilise earlier and current experience and investments to facilitate planning and production activities</p> <p>-The first time the NCC production team produced for the internal customer, NCC Housing</p> <p>-The first time that the NCC production team and NCC Housing had used NCC Teknik for energy declaration</p>	<p>-NCC Housing mobilised the architect and installation companies to use 3D and VDC</p> <p>-The NCC production team mobilised the frame supplier to supply bathrooms in construction elements to facilitate production activities on site resulting in new development activities at the frame supplier</p> <p>-The NCC production team mobilised the frame supplier to adjust the exterior wall to facilitate production activities which affected development activities at the frame supplier</p>
<p><b>Inter-project (Östra Orgeln in relation to the other projects)</b></p>	<p style="text-align: center;"><b>Cell 3</b></p> <p>-An NCC project in Linköping inspired the inclusion of two types of customers</p> <p>-The same NCC production team was used for six projects to facilitate planning and production activities</p> <p>-The NCC production team continued to produce for NCC Housing (sole customer) in the following project, Västra Orgeln to facilitate planning and production activities</p> <p>-NCC overlaps planning and production activities in all six projects to facilitate slack between projects</p> <p>-NCC Housing departs from NCC Construction's technical platforms and standards but includes new solutions related to other projects (exterior wall, individual measurements, LED lighting)</p>	<p style="text-align: center;"><b>Cell 4</b></p> <p>-The NCC production team mobilised the frame supplier to adjust the exterior wall during several projects to improve development and production activities</p> <p>-The NCC production team mobilised the creation of a new bathroom wall in an earlier project due to requirements from Uppsalahem</p> <p>-NCC Construction mobilised the same production team for Uppsalahem stretching over several projects</p> <p>-NCC Construction uses the same installation companies and knowledge from Uppsalahem projects in other projects</p>

**Table 3.** How NCC handles the four organisational issues in relation to renewal in the focal project, Östra Orgeln, and the inter-project environment of which this project is a part.