Construction client collaboration for inter-organizational innovation

- do too many cooks really spoil the broth?

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Abstract

Our built environment has the power to influence where we live and work, how we transport ourselves, how and what we consume and many other behaviors in our everyday lives, in other words, it has a significant impact on our global environment and economy. Given the notable need for more sustainable development of both the global environment and economy, sustainability has become a critical factor also in the area of urban development. With this as a backdrop, the construction industry and its many actors, such as clients, contractors and suppliers, that collectively drive urban development, play a significant role in creating sustainable development.

Innovation is a cornerstone to achieve development, so also in the construction industry. However, with its many interrelated organizations, projects and actors, innovation inevitably becomes inter-organizational. From an urban development perspective, inter-organizational innovation will happen in a multi-project context where several construction projects, led and executed by different actors from different organizations, become interdependent and are therefore required to collaborate. In any construction project, the client holds a key position and has been identified as a critical supporter for successful innovation and collaboration. On the back of these dynamics, the purpose of this licentiate thesis is to explore clients' role in a multi-project context where inter-organizational innovation is initiated to drive sustainable urban development.

From a contingency perspective, the purpose of this study has been explored through a multiple-case study where coordinated construction logistics, during the study, has been identified as inter-organizational innovation. The study has shown that coordinated construction logistics, developed for a multi-project context, must be developed and implemented differently than in a single project or organization. In other words, coordinated construction logistics can take the form of different types of construction innovation. The construction clients, in this thesis the building developers, are identified as being important to support innovation and collaboration within and between parallel and sequential projects. The study has also shown that different clients behave differently when inter-organizational innovation is present; whilst some are proactive to achieve development, others are hesitant and less supportive for change. The findings suggest that long-term committed clients take a more proactive stand for innovation, for example, by including innovation in their procurement strategies and reflecting on how to best implement it in their projects. Additionally, in a multi-project context, the collaboration between clients is found to be important in order to successfully implement innovation, for example to align procurement strategies with the next-door neighbors and to create opportunities to communicate with each other.

A theoretical contribution from this thesis is that coordinated construction logistics, which is often seen from a supply-chain management perspective, could be considered as inter-organizational innovation. This conclusion expands the understanding of the empirical phenomenon and its context. Furthermore, adding to the on-going discussion on clients as innovation supporters, their role as a potential innovation supporter is established in a multi-project perspective, but where differences between different types of clients must be taken into account. The multi-project context also implies an increased need for client collaboration, which is often informal, why the clients themselves need to handle all the aspects of collaboration. Tentative findings indicate that in this context time, spatiality, innovation and requirements will affect this collaboration. From a practical side, the findings show that initiating and implementing inter-organizational innovation requires understanding of the context, such as project objectives and the system. For clients and governments active in urban development, the thesis can guide the understanding of the importance of collaboration and choosing procurement strategy for inter-organizational innovation.

Keywords: Construction industry, client, inter-organizational innovation, multi-project context, client collaboration, receptive context

Sammanfattning

Vår byggda miljö påverkar var vi väljer att bo och arbeta, hur vi transporterar oss, vad och hur vi konsumerar och har därför en stor påverkan på den globala miljön och ekonomin, därför är hållbarhet idag en nödvändighet inom stadsutveckling. Byggindustrin och dess många aktörer, t.ex. beställare, entreprenörer och leverantörer, spelar en betydelsefull roll för att åstadkomma hållbar stadsutveckling. För utveckling i stort behövs både konstant förändring och insatser för innovation. Innovation i byggindustrin blir interorganisatorisk-innovation eftersom industrin är uppbyggd av många sammankopplade aktörer, projekt och organisationer. I stadsutveckling sker interorganisatorisk-innovation i ett multiprojekt-kontext, där flertalet byggprojekt leds och utförs av olika aktörer som blir beroende av varandra och måste därmed samarbeta. Beställare, genom sin centrala position, har identifierats som viktigt för att framgångsrikt åstadkomma både innovation och samarbete. Utifrån detta så har syftet med denna licentiatavhandling varit att utforska beställarens roll i multiprojekt-kontext där interorganisatorisk-innovation är initierad för att driva på hållbar stadsutveckling.

Målet med studien har, från ett kontinuitetsperspektiv, utforskats genom en fallstudie där samordnad bygglogistik, under studiens gång, blivit definierat som interorganisatorisk-innovation. Studien har visat att samordnad bygglogistik utvecklad för multiprojekt-kontext, så som stadsutvecklingsprojekt, måste utvecklas och implementeras annorlunda från bygglogistik i enskilda projekt eller organisationer. Med andra ord kan man se samordnad bygglogistik som flera olika typer av innovation. Beställaren, som i denna studie är beskriven som bostadsutvecklaren, är identifierad som viktigt för att stödja både innovation och samarbete inom och mellan parallella och efterföljande projekt. Studien har visat att det finns skillnader mellan olika typer av beställare när det kommer till interorganisatorisk-innovation, medan några är proaktiva för innovation så är andra mer avvaktande och mindre stödjande. Långsiktiga beställare är identifierade att ta en mer proaktiv roll för innovation, genom att inkludera innovation i deras upphandlingsstrategier och reflektera över hur innovation bäst implementeras i deras projekt. I ett multiprojekt-kontext blir samarbete mellan beställare viktigt för att implementera innovation, i form av att koordinera upphandlingsstrategier och skapa informella forum för möte och kommunikation.

De teoretiska bidragen från denna avhandling är först att samordnad bygglogistik kan ses som interorganisatorisk-innovation, istället för att anta det traditionellt förkommande och rationella förvaltningskedjeperspektivet. Det här utvecklar förståelsen av det empiriska begreppet and dess kontext. Vidare adderar studien till den pågående diskussionen om beställare som innovationsstödjare, genom att visa att beställare har potential att stötta innovation i multiprojekt-kontext men att typ av beställare måste inkluderas i diskussionen. Detta multiprojekt-kontext innebär också att behovet av samarbete mellan beställare ökar, där beställarna själva måste ansvara för detta ofta informella samarbete. Preliminära resultat visar att tid, rum, innovation samt krav kommer påverka detta samarbete. Från ett praktiskt perspektiv visar resultaten av denna studie att förståelsen av kontextet är viktigt vid initiering och implementering av interorganisatorisk-innovation. För beställare och myndigheter som är aktiva i stadsutveckling så kan resultaten vara en guide för att förstå vikten av samarbete och val av upphandlingsstrategi när interorganisatorisk-innovation är närvarande i multiprojekt-kontextet.

List of appended paper

Paper 1: Coordinated Construction Logistics: an Innovation Perspective
Hedborg Bengtsson, S.
Under review for possible publication in Construction Management and Economics

This paper was written by Susanna Hedborg Bengtsson, who also gathered the empirical material. Supervisors Tina Karrbom Gustavsson and Per Erik Eriksson contributed by commenting on the paper.

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Paper 2: Users' Influence on Inter-organizational Innovation: Mapping the Receptive Context
Hedborg Bengtsson, S., Karrbom Gustavsson, T. and Eriksson, P-E.
Under review for possible publication in Construction Innovation

This paper was written by Susanna Hedborg Bengtsson, Tina Karrbom Gustavsson and Per-Erik Eriksson. Hedborg Bengtsson gathered the empirical material in collaboration with Karrbom Gustavsson, Eriksson and six master students. Hedborg Bengtsson initiated the paper and conducted most of the writing. Karrbom Gustavsson and Eriksson contributed by jointly designing and editing the paper with Hedborg Bengtsson.

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Paper 3: When you don't have your own block: Horizontal supply chain integration in multi-project contexts
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However, in the end, maybe mostly to Chili...

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1. Introduction

1.1. Background

Urban development and sustainability are two terms that are increasingly discussed in connection with each other. Our built environment has the power to influence where we chose to live and work, how we transport ourselves, how and what we consume and many other behaviors in our everyday lives. In fact, sustainability has become a critical aspect in modern urban development, as the built environment has shown to have a significant impact on our environment and global economy. The construction industry and its actors, such as governments, clients and contractors, have an important role to play here, as they shape the built environment, through restoration and conversion, as well as initiate extensions and new parts of the built environment. Within this large and fragmented industry, change is constantly present, as it is within all organized settings (Chia, 2013). However, to increase the sustainability, an increased attention to change and innovation in the built environment is suggested (van der Heijden et al., 2012). Where change is ever-present, innovation requires more deliberate actions to be embedded (Rogers, 2003) both within organizations and in our society at large.

> "Innovation involves deliberate preparations, objectives, and planned benefits for new ideas that have to be realized and implemented in practice. It is the theatre where the excitement of experimentation and learning meets the organizational realities of limited budgets, established routines, disputed priorities, and constrained imagination." (Dodgson & Gann, 2010, p. 12)

The excitement between experimentation and learning, on one side, and organizational realities on the other, as so accurately explained in the quote above, is what makes change and innovation in organizational studies interesting. Innovation in general and also in the construction industry comes in many forms, for example either as product or process innovation (Hullova et al., 2016). Product innovation in construction is for example a new building material or a new machine. Process innovation can be everything from new project management tools to new processes to perform a project such as coordinated construction logistics, where the latter will be in focus in this thesis. Innovation in construction is important as both product and process innovation can lead to quality improvements (Winch, 1998), increased productivity and economic growth (Slaughter, 1998). Furthermore for the construction industry, and built environment at large, innovation can increase sustainability, both by lower the environmental impact and by positively affect social benefits, for example by lower production cost to make housing cheaper.

Looking at innovation for urban development and in urban development projects, innovation becomes inter-organizational as the innovation process both involves and affects many organizations present in urban development projects, and their respective actors (Smith, 2016). However, collaborating on inter-organizational innovation is not easy and there are many attempts that fail (Bjerregaard, 2010; Cabrera & Cabrera, 2002; Levina, 2005). Research has shown that it is often difficult to identify relevant variables, factors and relationships; this dynamics makes it difficult to foresee and plan the innovation process (Loch et al., 2008). To explore inter-organizational innovation from a context perspective can therefore increase the understanding of the innovation process.

1.2. Problem discussion

Construction as a project-based industry involves inter-organizational projects (Bakker, 2010; Manning, 2008), with interdependent organizations (Winch, 1998), where different competences must collaborate for a limited time. This means that different institutionalized norms, practices, relations etc. (Dille & Söderlund, 2011) meet and will guide the actions for collaboration. This may also hinder change and renewal of construction projects (Kadefors, 1995; Manning, 2008). In urban

development projects several inter-organizational projects are performed sequentially and in parallel, leading to interdependencies between the projects as well (Engwall & Jerbrant, 2003). This means that different clients and contractors must collaborate in a multi-project context. Due to this, innovation in multi-project contexts in the construction industry is complex and implies extensive collaboration. Clients are identified as an important actor to bridge the divides between different actors and to increase collaboration by serving as innovation supporters in, and between, inter-organizational projects (Blayse & Manley, 2004; Kulatunga et al., 2011). Clients, as innovation supporters, are discussed mainly from a single project perspective (Kulatunga et al., 2011; Loosemore, 2015; Ozorhon, 2013). However, a multi-project perspective is also interesting to apply, so as to explore collaboration between clients. Taylor and Levitt (2007) identified a need to research innovation from an inter-organizational perspective in order to understand the innovation process in the system of projects, dominating the construction industry.

The complexity of the construction industry and its interdependent actors requires research to take a systemic perspective, where context and history (Engwall, 2003) becomes important to understand change and especially innovation. Furthermore, in this context, different actors will have different possibilities to affect both short-term and long-term outcome in and between projects. As described above, construction clients are identified and highlighted as an actor with possibilities to support innovation. Nevertheless, if, how and when clients can serve as innovation supporters are still debatable (Ingemansson Havenvid et al., 2016; Kulatunga et al., 2011; Loosemore, 2015). Clients, in terms of housing developers, are found to view the planning process as uncertain (Olander & Landin, 2008), which could potentially hinder them to include innovation. However, clients can be seen as an actor with direct possibilities to influence the construction industry to develop a sustainable built environment (Högberg, 2014). For example, they have the power to initiate innovation for sustainable solutions in their projects, they are the link between government's demands and contractor execution, and they can affect both the planning, design and production of a project as well as the long-term real-estate management. Clients own several processes and tools with which they can affect their projects. For example, one tool that has been identified as important to both implement and initiate innovation is clients' procurement strategies (Eriksson, 2010a). Through the procurement strategies clients can influence both the project process and project outcome. Because of this, procurement strategies are interesting when exploring innovation, as they can be designed to support both innovation initiation and implementation (Eriksson & Szentes, 2017).

1.3. Research purpose and questions

To contribute to the research on clients' possibility to support innovation in project-based settings, especially within the construction industry, a multi-project perspective is taken. Where the purpose of the study has been to explore clients' role in multi-project contexts where inter-organizational innovation is being initiated to drive sustainable urban development. As mentioned above, one example of inter-organizational innovation in construction is coordinated construction logistics applied in multi-project contexts, an emerging new process initiated and adopted by industry actors. The empirical phenomenon of coordinated construction logistics, as identified by industry actors, has during the study been identified as an empirical example of innovation. This example will be explored to increase knowledge on how clients can support innovation, and how they can use their procurement strategies as a tool to do so; where greater possibilities for sustainable development of the built environment emerge. From the purpose of the research, three research questions have been identified and explored during the study:

- RQ1: How can construction logistics be elaborated on from an inter-organizational perspective?

- RQ2: How can clients' role be understood in relation to inter-organizational innovation in multi-project context?
- RQ3: How do clients' procurement strategies affect collaboration in multi-project contexts?

The first question is identified to explore how the empirical phenomenon construction logistics can be understood outside a supply-chain or a operational management perspective. In other words, what can be learnt about construction logistics if studied from an organizational perspective? From this, the second and third questions go deeper into a context dependent perspective to explore clients' role in multi-project contexts. Here construction logistics is used as an empirical example of inter-organizational innovation present in the construction industry. The research questions have been explored from a contingency perspective, and partly also using Pettigrew's et al. (1992) framework for receptive context for change as an analytical lens. The focus has been on clients, as an actor, in a multi-project context where innovation changes the project processes, as the unit of analysis. To enable this exploration, one main empirical setting was chosen where a local government, a city in the role as public client, has initiated inter-organizational innovation, i.e. a construction logistics center, in one of their urban development projects. This innovation was initiated to drive the appointed housing developers (here named clients) and their contractors and suppliers to change their project processes in order to increase the environmental sustainability in the urban development project.

The phenomenon of coordinate construction logistics can of course be explored from many different angles, which is why limitations must be made so as to define a more narrow research area. Coordinated construction logistics is most commonly researched within supply-chain management or operational management, from a rational perspective with focus on how production sites, and especially material handling, can be run more efficiently (see for example Ekeskär & Rudberg, 2016; Sundquist et al., 2018; Thunberg et al., 2017; Vrijhoef & Koskela, 2000). Whilst such research drives improvement in areas such as how transportation and materials are handled on-site, it does not give an understanding of how the phenomenon affects the construction process as a whole.

Creating a broader understanding is important as the field is emerging in both practice and research. Accordingly, more comprehensive research can serve both to increase the understanding of an emerging change in practice and to develop new knowledge on coordinated construction logistics in research. The latter is of interest as coordinated construction logistics is a commonly addressed change process in the project-based construction industry. It has the possibility to affect how the supply-chain and the construction process interact, how construction actors' interrelations look, and how planning and design handles on-site logistics. Therefore coordinated construction logistics can be seen as a change process within the construction industry, and as an innovation since it is a "*practice, or object that is perceived as new by an individual or other unit of adoption*" (Rogers, 2003, p. 12). This angle is interesting since innovation research can enable discussions on hinders and possibilities for change in the construction industry with the numerous fragmented interdepented actors and processes (Bankvall et al., 2010).

Based on this line of thought, this study focus on innovation in order to increase the understanding of the studied empirical phenomenon. Furthermore, the literature review conducted as a part of this study identified a gap in the understanding of clients' role for change and innovation in the project-based construction industry. Namely when and how a multi-project context affect clients, where they need to collaborate between each other in order to both implement innovation and ride their project life cycle, as findings from a single project context are not automatically valid in a multi-project context (Lycett et al., 2004). A multi-project context, in combination with inter-organizational innovation and clients' role will be elaborated on in the next chapter discussing previous relevant research in the area.

2. Previous research and theoretical framework

This chapter reviews what has previously been researched in the area of change and innovation in project-based settings and the clients' role for innovation. It will also cover clients' procurement strategies for collaboration and innovation. In order to explain how this study understands change in organizations, the chapter will start by shortly present the applied understanding of organizational change. A detailed understanding of the thought style applied in this study is explained in the section on research design in the Method chapter. The second part of this chapter discuss the used theoretical framework, by first describing a contingency perspective as a pervading view throughout the study and thereafter describing Pettigrew's et al. (1992) receptive context for change which is partly applied in the study.

2.1. Change and innovation in project-based settings

2.1.1. Change in organizational studies

With guidance from Weick's (1979) shift of focus from organizations to organizing, Tsoukas and Chia (2002) describe organizations as partly structured with established patterns, and partly ever-changing with emerging patterns. This constant change process is understood to come from the social organizational members' constant need to adopt and respond to new circumstances. These human actions mean that there is an on-going process of change in organizations; however, this does not mean that organizations constantly change (Tsoukas & Chia, 2002). For example, some actions might not be recognized at all, some might only lead to local change, whilst other actions might lead to change in whole organizations i.e. become institutionalized (Meyer & Rowan, 1977). For organizational change Wenger (2000) suggests that formal organizing is important even though the learning takes place in the informal processes. This is because the formal organizing services the informal processes, where learning and innovation is linked in organizations (Brown & Duguid, 1991). Furthermore, learning should take place both within organizations but also with the surrounding, e.g. in industries. Latour (1990) highlights this learning process through human actions to create change:

> "The force with which the speaker makes a statement is never enough, in the beginning, to predict the path that the statement will follow. This path depends on what successive listeners do with the statement." (Latour, 1990, p. 104)

We can conclude that for successful organizational change the participants' actions and learning are important. New knowledge is created when participants are able to embrace the unknown and commit to learning (Edmondson, 2012). On the other hand, stability in the form of organizational routines is suggested to enable change (Feldman & Pentland, 2003). Instead of seeing routines as inflexible, and a source of inertia, it can be a source for change and flexibility. Organizations include many participants with different background, information and interpretation that can come together through routines. Their differences will lead to several streams of actions and when accounting for time and space their actions will lead to change in routines (Feldman & Pentland, 2003). Therefore, not even routines are stable over time and space. In summary, the understanding of organizational change as constant in this thesis is now established and a continued focus on innovation from this premise will be further elaborated on from hereon.

2.1.2. Innovation in project-based settings

While change is constantly taking place; innovation often requires more deliberate actions. In present research, innovation is applied to various changes happening in all imaginable settings, from adopting minor process improvements in a production chain to radical transformations of entire industries, driven by outside actors. This diverse usage of the term innovation has led to

discussions and different understandings of what it means and implies. If we were to generalize, two ways to view innovation are currently visible in research. The first version is that innovation can only refer to something completely new that has been adopted in a broad setting. The second, and more commonly used, version describes innovation as a process or product that is perceived as new to an organization able to adopt it, adopted from Rogers (2003). This definition provides broader application and therefore a potential wider use of innovation theory, as might be suitable when exploring innovation within a specific industry even though similar changes might have occurred earlier in other settings.

It is important to understand the setting or the context when exploring innovation as the initiation, development and embedding will vary. Innovation in project-based settings will have other requirements due to the temporary organization (Lundin & Söderholm, 1995) between fragmented actors than for example the continuous production lined manufacturing industry. To give an example, a common separation in manufacturing studies is between product and process innovation (Hullova et al., 2016). Process innovation is defined as new methods that create changes in tools and software (OECD, 2015). In manufacturing studies process innovation is seen as a bi-product to product innovation, i.e. when a new product is changed, parts of the production process needs to be changed as well. This separation will not be valid in project-based settings were process innovation is re-occurring in and of itself. The reason for this is that a significant part of the effort in projects is to align the actors and tasks to the temporary context created for the specific project, or in other words, the processes. This thinking aligns with Engwall's (2003) findings of the importance to take history, scope and environment into account to manage innovation in projects. Another way to explore innovation is to separate between incremental and radical innovation also used in project-based settings (Slaughter, 1998, 2000). However, as all projects have different actors, context and goals, the way projects are composed will also affect innovation, not just the type of innovation (Shenhar, 2001).

2.1.3. Inter-organizational innovation

Projects can take various forms, from small internal organizational assignments without a designated budget, to large-scale inter-organizational projects with many fragmented actors working together temporarily to achieve project goals with a large budget. The same goes for innovation, whilst it might be common to imagine innovation having been developed by a tight R&D department within an organization, inter-organizational innovation is becoming more common (Smith, 2016) where a large number of organizations collaborate in joint innovation efforts (Dooley & O'Sullivan, 2007). Inter-organizational innovation creates another aspect of complexity for innovation development, namely the collaboration between actors. Different actors with different professions and from different organizations leads to failure in many innovation attempts, due to asymmetry of interests and goals (Cabrera & Cabrera, 2002), different routines, practices and values (Levina, 2005) and different institutional logics (Bjerregaard, 2010). These dynamics leads to difficulties in applying common technics for project management (Lee & Veloso, 2008) which makes it difficult to plan the innovation process since identifying relevant variables, factors and relationships becomes difficult without the right technics (Loch et al., 2008).

Inter-organizational projects can be used to describe a context for inter-organizational innovation. They are interdependent but legally autonomous organizations with different competences, coming together for a limited time in projects, or temporary organizations. These temporary organizations exists in more stable contexts, of different organizations, which leads to different norms, practices and relations (Dille & Söderlund, 2011). These different contexts will guide the actions taken in the temporary organization, the inter-organizational project. This can limit the renewal and innovation (Kadefors, 1995; Manning, 2008). To add another dimension, important in this thesis, is when several inter-organizational projects are combined and must interact over inter-organizational

innovation, this can be referred to as multi-project context (Engwall & Jerbrant, 2003). An urban development project, where multiple construction projects from different actors are on-going in parallel, is an example of a multi-project context. This is highly relevant for innovation in construction as multi-project contexts are becoming more and more common, which will be further elaborated upon below.

2.1.4. Innovation in the construction industry

Construction is a project-based industry and inter-organizational projects are the primary unit of production (Bakker, 2010; Manning, 2008). In the industry at large, and especially within specific projects, innovation takes place constantly (Loosemore, 2015).While the construction industry has potential to generate innovation through its constant interactions between actors (Loosemore, 2015), innovation is mainly present within single projects. Spreading innovation between projects is identified as a particularly difficult area within the construction industry (Eriksson & Szentes, 2017). As discussed above, the multiple interdependent actors in inter-organizational projects can hinder innovation. Winch (1998) mentions the negotiation preceding all major changes as a complicating factor, and Lindgren and Emmitt (2017) suggest that the collective decision-making process is a hinder. To spread innovation from a single project to a larger context creates a dependency on inter-organizational networks (Bygballe & Ingemansson, 2014; Harty, 2005). To overcome these hinders, communication is vital for innovation in construction both to be developed and spread. Gann and Salter (2000) highlight the importance of making information available to all involved actors. However, in the inter-organizational context, where innovation is often co-developed (Eriksson et al., 2017), this is not enough and instead continuous tight communication between actors is required to enhance innovation (Eriksson, 2013).

Apart from communication, cooperation (Bosch-Sijtsema & Postma, 2009; Holmen et al., 2005; Ling, 2003), engagement (Widén et al., 2013) and awareness (Larsen, 2011) are all important to enhance innovation in construction. These factors become increasingly important as the context for innovation broadens, from a single project to a multi-project context. In other words, innovation, its development and embedding, must be aligned to its context (Alin et al., 2013; Taylor & Levitt, 2007). The loose couples between actors and organizations (Dubois & Gadde, 2002) in multi-project context and in the construction industry at large will impact the innovation process and outcomes (Bygballe & Ingemansson, 2014). To further understand construction innovation a division of types of innovation is interesting as it can provide understanding of how different innovations are initiated, developed and embedded, whilst always keeping the context in mind (Shenhar, 2001). Slaughter's (1998, 2000) types of construction innovation, from incremental, modular, architectural, systemic to radical, is useful to create an understanding of the degree of change and affected relations between actors and organizations.

2.2. Clients in the construction industry

2.2.1. Clients' role in construction

The fragmented construction industry is made up by many different actors with different professions, educations and roles to fulfil. Hence, many different angles can be taken when studying the industry and phenomenon in construction can be viewed from different actors' perspective. When studying innovation one frequently applied perspective is the construction project (see for example Holmen et al., 2005; Slaughter, 2000), another perspective is from clients as a decision makers (see for example Ingemansson Havenvid et al., 2016; Nam & Tatum, 1997). Clients are often seen as a central part in the construction industry as they initiate construction projects, often appoint or procure contractors, consultants and suppliers, and decide the project requirements within their project budget. However, it is important to separate between different kinds of clients. One common example is governments, acting as large public clients, executing infrastructure

projects and initiating urban development projects. Another example is housing developers, who invest and develop housing projects, either to manage long-term or sell after production. A final example is private individuals, who act as clients when building their own private houses to live in.

This thesis focuses on the second example, i.e. the housing developer, which can take the form of either a public or private client. They have either acquired or in another way been allocated a plot of land or an existing building to develop a construction housing project from. Together with investors they decide on a project budget, requirements for the finished product and a time line. In addition, they also set other relevant goals, such as sustainability goals. They plan and design their building together with their appointed consultants and apply for all necessary building permits from the local government. To produce the building, the clients procure contractors and lead them through the production. This management process looks different pending on for example type of procurement, e.g. direct procurement or through a public procurement act, and contract form, e.g. design-build contract, design-bid-build contract or partnering. From here on 'client' will refer to this type of developer and the rest of this chapter will focus on clients as innovation supporters and their possibilities to affect collaboration and innovation through their procurement strategies.

2.2.2. Clients as innovation supporters

The central and managing role of clients in construction also gives them an important role to create renewal through innovation and learning, both within and between projects (Ingemansson Havenvid et al., 2016). How clients can contribute to innovation is debated and more research on how clients can use their requirements to initiate innovation is needed (Ingemansson Havenvid et al., 2016). Research on clients leading and supporting change takes several perspectives and their potential as innovation supporters or change agents is further discussed.

The change agent role is researched in organizational studies and the role is suggested to include deciding what to change, facilitate, sell, implement (Miller & Lawton, 2002), lead and be responsible for the change (Caldwell, 2003). To support change and innovation certain characteristics are identify as important, namely: credibility, trustworthiness, sincerity and expertise (Armenakis et al., 1993). Within organizational studies several different roles are suggested as appropriate to support change, including managers and consultants (Caldwell, 2003). Research in construction has focused on clients as innovation supporters (Blayse & Manley, 2004; Nam & Tatum, 1997). On one side, their central role in the project network, which can enable inter-organizational communication, is a positive aspect to support innovation (Kulatunga et al., 2011; Ozorhon, 2013). However, on the other side, clients are often identified as risk and cost averse and lack incentives to support or initiate innovation (Blayse & Manley, 2004; Loosemore, 2015). It should be noted that there might be differences between different clients in terms of their support for innovation; their organizations must be positive and ready for innovation (Engström & Stehn, 2016). Furthermore, for clients to support innovation they must encourage group work, involve contractors early on and be proactive throughout the project (Eriksson et al., 2017; Kulatunga et al., 2011). This implies a direct support or initiation for innovation; the support could also be indirect, motivate project actors towards innovation through their requirements and procurement strategies (Ingemansson Havenvid et al., 2016). Specific objective to measure innovation is needed (Ozorhon, 2013) as the conventional objectives of time, cost and scope does not cover innovation initiatives within and between projects (Keegan & Turner, 2002).

2.3. Clients' procurement strategies

2.3.1. The procurement process in construction

The project-based construction industry has certain characteristics which lead to challenges in the supply-chains. More specifically, the numerous specialized actors with varied activities can create discontinuity due to the project set-up and some level of uniqueness between projects (Dainty et al., 2001; Eriksson & Pesämaa, 2012). These challenges will affect the clients' procurements and different strategies will lead to different outcomes both short-term and long-term. In a multi-project context the interdependencies between clients and projects must also be taken into account in the clients' procurement strategies. Depending on type of project and context different procurement strategies are advisable (Bresnen & Marshall, 2000). Depending on the level of complexity, customization, uncertainty, duration and time clients' procurement strategies go from a focus on competition to cooperation (Eriksson, 2008). As construction projects and their contexts are becoming more complex the interest and usage of partnering has increased (Bygballe et al., 2010; Crespin-Mazet et al., 2015). However, clients are identified as feeling vulnerable in their relationship to contractors, not wanting to add risk in form of cooperation from partnering; traditional contractual methods have been seen as less risky (Kadefors, 2004). Partnering is seen as an attempt to support collaboration between actors (Alderman & Ivory, 2007), with potential to increase innovation and project performance (Dubois & Gadde, 2002) through improved process integration and supply-chain management (Beach et al., 2005; Saad et al., 2002).

2.3.2. Procurement for collaboration

Clients can enhance the interrelations between project actors and increase the knowledge sharing by changing their procurement strategies (Briscoe et al., 2004; Eriksson, 2013; Lindgren, 2016). For example, partnering is identified as one method to enhance the collaboration. However, the positive effects suggested from partnering have been found difficult to fully realize. One explanation to this is the focus on the client-contractor relationship not involving other project actors in the partnering process and thereby in the collaboration (Dainty et al., 2001).

Understanding how to implement partnering is therefore important (Eriksson, 2010b) and that holistic change is needed in both processes and attitudes (Eriksson & Pesämaa, 2007). There is also a difference in the time frame of the partnering. Partnering was first defined as a long-term commitment between similar organizations, but in a construction context partnering is often done on a single-project level (Crespin-Mazet et al., 2015). A difference between project partnering and strategic partnering is identified (Chan et al., 2009), where the first focus on result whilst the second focuses on processes (Crespin-Mazet et al., 2015). Even though the two partnering strategies have different time frames, and number of included projects, they both still focus on the client-contractor relationship. When it comes to multi-project context, with several interdependent clients the client-client relationship also becomes interesting from a partnering perspective, in terms of horizontal partnering.

2.3.3. Procurement for innovation

Clients' procurement strategies to initiate or promote innovation are increasingly discussed in research, both as innovation procurement and from a partnering perspective. As the empirical material of this study does not include innovation procurement, it will not be in focus here. To create awareness and communication around innovation is important for innovation processes in construction (Larsen, 2011). Winch (1998) identified that procurement strategies can be designed to influence innovation by creating gainsharing between the involved actors. Partnering is suggested to encourage gainsharing and innovation, while competitive procurement is said to hinder gainsharing (Eriksson & Szentes, 2017). Traditional procurement strategies is believed to hinder innovation (Dubois & Gadde, 2002) through the often rapid tendering process and price-based competition, as

it promotes self-protective behavior (Blayse & Manley, 2004). This self-protective behavior is said to hinder trust and collaboration which is seen as essential for innovation (Ozorhon, 2013; Van Duren et al., 2015).

To create trust in order to make innovation happen the actors' role (often client and contractor) must be clarified and aligned during the procurement (Van Duren et al., 2015). The time frame becomes important in this context as trust often takes time to build. A long-term perspective is also crucial to make innovation last, as innovation needs to be transferred between projects, sequential and parallel, and organizations. Here, long-term strategic partnering is suggested (Ingemansson Havenvid et al., 2016). It becomes visible that inter-organizational relations and interactions are crucial both to initiate and to spread innovation. The short-term project focus of today's construction industry in combination with the competitive price focused procurement strategies are seen as reasons for low inter-organizational interactions, not taking time to explore potential innovation (Bygballe & Ingemansson, 2014; Hastie et al., 2017). A conclusion from this is that procurement strategies, that are planned and tailored to the actors and projects, have the possibility to enhance innovation.

To summarize the discussion on collaboration and innovation in the context dependent project-based construction industry three topics stands out. First, a multi-project context increases the process complexity and interdependencies between actors, where actions must be taken to bridge the gaps between the fragmented actors and projects and align them to common goals. Second, the clients' role in multi-project contexts become important to study especially in relations to inter-organizational innovation, as they are suggested as innovation supporters. Even though their capacity and incentives to initiate and implement innovation, in and between projects, is being questioned. Third, the clients' procurement strategies become increasingly important as the project context becomes more complex, and strategies must be tailored to ensure collaboration and innovation. Procurement strategies in those contexts should include more tendering objectives than time, cost and scope, where partnering is suggested to drive other objectives.

2.4. A contingency perspective

A contingency perspective has provided a lens for the study at large. Using the understanding that there is no "one best way" to organize, rather the optimal organizing is context dependent (Donaldson, 2001). Furthermore, a contingency perspective implies the belief that an organizing approach might not be equally effective in all contexts and that the organizing should conform with type of work and environmental conditions (Schoonhoven, 1981). From a widespread contingency perspective in research several variations of contingency theory have been suggested in organizational studies, all based on the assumptions that organizing depends on changing context characteristics instead of a general "one size fits all" forms of organizing. However, it has long been discussed whether contingency theory is in fact a theory, as it lacks interrelated propositions that are well-developed (Schoonhoven, 1981). A contingency perspective is in this study not applied as a theory, but rather as an organizing strategy. In other words, it is used as a guide for what phenomenon to explore and for how to explain the explored phenomenon. From this overall lens of the study, a theoretical framework supporting the contingency perspective is applied. Pettigrew's et al. (1992) framework for receptive context for change is explored in paper 2 and used as a theoretical lens in this thesis, as described in detail below. The framework conforms with a contingency perspective by highlighting a needed focus on organizational context to understand change and that receptiveness is a dynamic concept contingent on several factors working together (Pettigrew et al., 1992).

2.5. A receptive context for change in construction

2.5.1. What is the receptive context for change?

Change will affect the beliefs, structures and strategies of organizations or networks, through complex processes of analytical, political and cultural challenges (Pettigrew, 1987). Innovation and change are related as two intertwined concepts as innovation is dependent on, and also creates, change. The ability of organizations' to identify and adjust to change is critical for their innovative capabilities, which is often explored through an organization's absorptive capacity (Cohen & Levinthal, 1990). In a multi-project context, the framework of absorptive capacity is limited due to its intra-organizational focus. Instead Pettigrew's et al. (1992) framework of receptive context for change has been used to explore innovation in multi-project contexts. Pettigrew et al. (1992) have introduced a framework of 'receptive' versus 'non-receptive' contexts for change which can help to outline the receptiveness for change. The framework consists of eight features that should work together to create a context which is open for change or innovation, namely:

(1) quality and coherence of policy

(2) availability of key people leading change

(3) intensity and scale of long-term environmental pressure

(4) supportive organizational culture

(5) effective managerial-clinical relations

(6) co-operative inter-organizational networks

(7) simplicity and clarity of goals and priorities

(8) fit between the change agenda and locale

The framework is built on the view that change is context dependent and suggest that rather than employing a recipe-driven approach, research on change should focus on interdependences between individuals, organizations and networks (Burnes, 2004). Since change will go through different functions and hierarchies (Pettigrew, 1990). In line with this, receptiveness is seen as fluid, were changed conditions might alter the receptiveness of the context (Pettigrew et al., 1992). Receptiveness is suggested to be built up over time, in a slow complex process (Ferlie & Shortell, 2001). The features are not to be regarded as a check-list, but rather as inter-connected aspects that work together to strengthen the receptive context, or in other words contribute towards change and innovation. Regardless of a receptive context for innovation, managing innovation in complex systems is always associated with difficulties (Davies et al., 2014). However, the framework is suggested to provide some logic and terminology regarding where, why, how and by whom innovation happen, or does not happen (Pettigrew et al., 1992). Larsen (2011) stresses the importance to get a fuller picture of the contextual setting for actors in innovation processes in the construction industry. Furthermore, for clients to support construction innovation, receptiveness is suggested to be a valuable characteristic (Kulatunga et al., 2011).

The examples given by Pettigrew et al. (1992) to support the framework are all different process changes in inter-organizational networks affecting many interdependent actors and their work processes. These examples are similar to the empirical setting explored in this study, in terms of inter-organizational collaboration over innovation between interdependent actors from different organizations and professions. This is why the chosen framework has been used to investigate the

receptiveness of inter-organizational innovation in the study. The features have in paper 2 been adapted and evaluated in the loosely coupled construction industry context, providing that the framework was developed in the healthcare industry. Both the healthcare and the construction industry are commonly labeled as traditional and change-resistant. Furthermore, both are segmented, consisting of a wide range of interdependent actors from different professions (Dubois & Gadde, 2002). However, the construction industry is largely project-based, which should be reflected in the adoptability of the framework. Accordingly, the explored alterations of the framework in paper 2 are mainly included to capture the context of the project-based construction industry. In summary, feature 4, 5 and 6 are adapted so as to also capture that a main part of the activities in the construction industry happens within and between projects. For Feature 4, the supportive culture should also include cultural aspects between organizations. Feature 5 is described to include all different professions and their relationships within and between organizations and projects. And finally, Feature 6 now also captures the co-operation between organizations and projects.

2.5.2. The understanding and usage of the framework

As mentioned above, in paper 2 the framework receptive context for change (Pettigrew et al., 1992) has been used to analyze the change context in Case 1 (see Method chapter) by mapping each feature, first individually and then combined. For a detailed description of this work see the appended paper 2. Overall, the concept of receptiveness is adopted from the framework in the thesis. Rather than digging deep into the eight features suggested within the framework, it has been used as a guide on how to view change and that a receptive context is important to explore when researching change and innovation. From a project-based setting, i.e. the construction industry, this is in line with Engwall's (2003) findings that projects must take history and context into account. This view has guided the study from the start, and has made it possible to also adapt a focus on receptive context for change. In the chapter titled Discussion receptiveness for change has been used as a base for the integrative discussion based on the findings from the separate studies included in the study.

The context where receptiveness is discussed is the multi-project context of the construction industry. With urbanization, the multi-project context is increasingly more common for housing projects, especially urban development projects. With the different clients and their contractors working parallel to each other with the same difficulties, the receptiveness need to happen in the network created formally and informally between the actors and their organizations and projects. As the purpose of the study focus on clients' role in this context, especially when inter-organizational innovation is enforced, the receptiveness is discussed from clients' perspective. How clients can influence the receptive context for change, e.g. collaboration between clients and the usage of procurement strategies as a tool is included in research question 2 and 3. This will be described in detail in the next chapter discussing method and methodology.

3. Method

This chapter provides a description of the research design for the study and illustrates how the research questions, papers and cases interrelate. Furthermore, the chapter also presents the cases that are included in the study and discusses the methods applied for empirical material gathering and analysis. Additionally, a discussion on research quality is included in the end of the chapter. However, to establish the relevant background understanding, the chapter starts with an overview of the study and its initiation.

3.1. Background of study

This study was started as a continuation from a shorter study which included a series of studies by six master students and two senior researchers all exploring clients' procurement strategies in multi-project context, conducted during 2015 to 2016. Therefore, gathering of empirical material for the three appended papers have been done in collaboration. On the back of the previous studies, this study took a client perspective from the start and was set out to explore clients' procurement strategies for coordinated construction logistics in multi-project context for sustainable urban development. Broadly speaking, this focus area has thus far been kept in the study. However, as the study has evolved, an innovation perspective in multi-project context has been applied, where coordinated construction logistics has been identified as an empirical example of a current innovation in the Swedish construction industry. This perspective was identified as construction logistics has this far mainly been studied from a supply-chain management perspective, applying a rational mindset with focus on increasing production efficiency in construction projects. To develop the field and enable the inclusion of sustainability in the scope, an elaboration of construction logistics seemed necessary. More specifically, a more holistic understanding of the phenomenon could be developed. In summary, the scope of the study has landed in exploring the clients' role, e.g. their procurement strategies, in inter-organizational innovation for sustainable urban development. In the concluding chapter of this thesis, a discussion on the possible direction for the scope of the second part of this study is provided.

3.2. Research design

To apply a contingency perspective and explore inter-organizational innovation in a multi-project context necessitates a set of assumptions around the thought style that underlies the research design. As Chia (2013) clearly states:

> "Adopting either a *representationalist* or a *social constructionist* epistemological outlook brings with it wide ranging consequences as to how we view knowledge, how we go about researching social phenomena and how we interpret our research findings."

In existing research, construction logistics have mainly been studied from a representationalist outlook, or in other words, from a rational mindset were organizations are seen as stable entities, and natural objects of analysis, rather than studying the relationships in-between them. This approach is questioned in today's management and organization research, as it limits the possibilities to describe how and why something happens (Alvesson & Sköldberg, 2009). When taking a contingency perspective to explore the understanding of coordinated construction logistics as inter-organizational innovation, the focus is shifted to increase the understanding of actions, movement and processes (Chia, 1995), or in other words, a focus on organizing rather than organizations. Furthermore, to take this interpretative and subjective view of the world and science makes it important to study the actors in it as they are given meaning and power, i.e. a practice-orientation (Nicolini, 2012). This attention placed on actors aligns with the presented research questions that are focused on one type of actor, the client, and its role in inter-organizational innovation. To explore an actor's role from a practice standpoint, qualitative research is suggested

as it can provide rich explanations on how and why actors act as they do (Silverman, 2013). This viewpoint will, as is highlighted in the quote above, shape the interpretation of the research results, where the focus on actors will have implications on the result. This could surely be questioned from a rational standpoint, but on the other hand, it will create an opportunity to visualize the complexities involved in inter-organizational innovation occurring in multi-project contexts, such as urban development projects.

The abovementioned qualitative research approach has been presented as useful to study organizing from an actors' perspective. Qualitative research is also useful when taking an explorative approach and studying an on-going empirical phenomenon such as construction logistics rather than studies in retrospect. When studying on-going empirical phenomenon, an explorative (Edmondson & McManus, 2007) and reflexive (Alvesson & Sköldberg, 2009) approach is essential in order to be able to capture interesting, but not yet explored, areas of the research field. The details of the research design have been developed as the study has evolved, which is common for qualitative research in order to ensure a reflexive mindset where actions and findings have guided the research forward (Alvesson & Sköldberg, 2009). An abductive research strategy is used in the study to further ensure a reflexive mindset, where the early findings have guided the formulation of further research questions and developed papers. This approach will be elaborated upon below, when describing the interrelations between research questions and appended papers. The interchanging between empirical findings and theory has also helped increase the sense making and understanding as a researcher.

Qualitative research is subjective and depends on the researcher, every researcher can interpret gathered empirical material differently and the gathered material will also depend on the researcher in terms of interest area, background etc. (DeWalt & DeWalt, 2010). This subjectivity can be used as an advantage, for example to get access to empirical material. My background as a project manager in the construction industry has given me a good understanding of the general industry dynamics, its actors and companies, and most importantly its different cultures, which has helped immensely in the communication with the case study participants. By using the same language and being able to generate a familiarity (Czarniawska, 2007) the participants have felt more open during interviews and have welcomed me to meeting observations. Furthermore, my industry experience has also been helpful in decoding empirical material. However, by taking guidance from Czarniawska (2007) I have made conscious effort not to come too close to the participants in the cases, so as to become one of them, and instead I have rather taken a step back and focused on observing the bigger picture as is relevant for the research scope. To describe an example, I received an invitation from the Senior Project Manager of Case 1, Stockholm Royal Seaport, to use their project office as a workplace to come closer to the case. While this offer was generous and have increased my observation time of the case and enabled informal talks and meetings with the participants, great care have been taken not to get involved in specific project discussions to affect the participants. The presence of a researcher will of course affect an office and its employees; however, the only effect that I noticed has been an increased awareness of the studied innovation, their coordinated construction logistics model, and the employees' perception that management thought the innovation was important.

3.2.1. Interrelation between papers and research questions

As the study has evolved over time, using an abductive strategy, the research questions and appended papers have all evolved in relations to and based on each other from the reflexivity between empirical material and theory, see Figure 1 for an illustration.

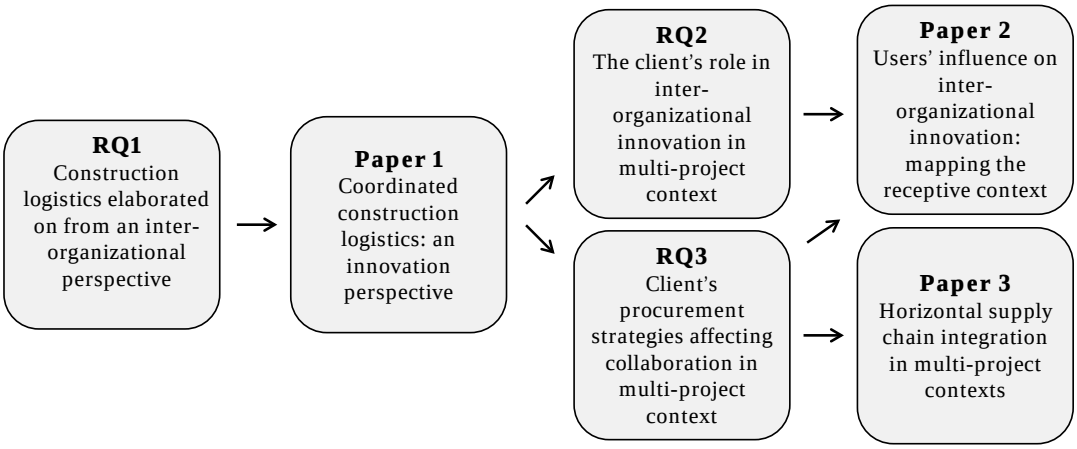

Figure 1: Illustration of interrelation between research questions and appended papers

When the study started, during the second half of 2016, the six master students and the two senior researchers had gathered empirical material in the form of interviews in Case 1, Stockholm Royal Seaport. Therefore, the study started with analysis of empirical material in combination with a continuous literature study. This analysis led to the identification of a gap in how construction logistics was studied, to elaborate on the phenomenon for a more holistic understanding (RQ1). To explore RQ1, new empirical material was needed from comparative cases, Case 2-5, to develop Paper 1. To deepen the understanding of coordinated construction logistics in multi-project context a deepened innovation perspective from clients' viewpoint (RQ2) and clients' procurement strategies for collaboration in multi-project contexts (RQ3) were identified from RQ1 as important to explore, from those Paper 2 and Paper 3 were developed. These two papers illustrated in greater detail client collaboration in multi-project context, one from an inter-organizational innovation perspective and the other from a horizontal supply-chain integration perspective. Table 1 summarizes what empirical material that has been included in each paper and which research questions the paper explores.

Table 1: Summary of empirical material and research questions per paper

Appended papers	Empirical material	Research questions
Paper 1 Coordinated construction logistics: an innovation perspective	Case 1 – 5 Semi-structured interviews, Meeting observations, Document studies	RQ1
Paper 2 Users' influence on inter-organizational innovation: mapping the receptive context	Case 1 Semi-structured interviews, Meeting observations, Document studies	RQ 2 RQ 3
Paper 3 Horizontal supply chain integration in multi-project contexts	Case 1 Semi-structured interviews, Meeting observations, Workshops	RQ 3

3.3. Research method per study

This study consists of three sub-studies. The first sud-study is a literature study, divided in a systematic part and a continuous literature and document study throughout the whole study. The second sub-study is a single-case study in the urban development project Stockholm Royal Seaport, Case 1, including interviews, meeting observations and document studies. The third sub-study is a multiple-case study of different coordinated construction logistics models in Sweden, Case 2-5. These three studies are described in detail, including gathering of material and analysis, below.

3.3.1. Literature study

The literature study is divided in two parts, a continuous study and a systematic literature review of the field. To get an overview of the field the study started with the ambition to get an initial understanding of sustainable urban development, clients' procurement strategies and change in the construction industry. Initially, the literature study was not done systematically as it took some time to understand what search terms to use and where to find the relevant literature. In parallel to this, reports and governments documents were studied to get an understanding of the empirical field. During this process, as more and more literature was identified, it became increasingly interesting to explore the empirical field of construction logistics from an innovation perspective as a gap in the holistic understanding of the phenomenon was discovered, as is discussed above in the section Research design. On the back of this process, a more focused study of the literature on innovation in general and innovation in project-based settings and within the construction industry in particular was initiated. For the most part, snowballing (Kvale & Brinkmann, 2014; Mack et al., 2005) is used as a method to identify relevant literature for my continued reading. The difficult part of the continuous literature study is to keep track of what I read and to document the interesting findings to be used for analysis. Therefore, I created a catalogue documenting the relevant information on all articles, conference papers and books I read, with aim to have a searchable list of the literature. In combination with this, notes have been taken throughout the literature study.

When the potential angle of studying construction logistics as innovation was identified, I decided to conduct a systematic literature review, in order to get an understanding of what had been written in the field and what gaps could be explored further. To start the review I identified that the interesting areas to explore would be innovation in project-based settings, innovation in the construction industry and to focus on process innovation and systemic innovation, i.e. broad innovation spreading through a system. These areas where identified as interesting in the continuous literature study and in line with the study's scope. The review took a meta-review approach with the aim to document the leading research within the field (Glynn & Raffaelli, 2010). Furthermore a systematic approach was used according to the following steps: design the review, collect literature, extraction and quality assessing, snowballing through references, and analysis. In the design phase, three databases were selected to retrieve a broad spectrum of potential literature from both technical and management journals, namely: Scopus, Web of Science and Sciencedirect. Following the standard practice for literature reviews, a combination of search terms were used to search in title/abstract/keywords from the year 2000 until January 2017; Table 2 presents the combinations of search terms (i.e. project AND "systemic innovation", project AND "process innovation" etc.).

In addition to this, criteria for the extraction process were established during the design phase, namely exclusion of articles with topics other than innovation in project-based settings. Included in Table 2 is a compilation of the number of collected publications per search combination, which totals to 2,527 search results. Apart for eliminating duplicates, conference papers, serials and books the extraction process narrowed down relevant articles by going through title, number of citations and publication journal. This process distilled out 123 articles. After analyzing the abstracts, 23 relevant articles were chosen, mainly based on their focus on innovation in project-based settings, e.g. the construction industry. To reduce the possibility to have omitted important articles in the

field snowballing (Mack et al., 2005) was used by going through the relevant articles reference lists. This yielded another 14 articles, which were included in the literature review.

Table 2: Search result per search term combination in the systematic literature review

	Systemic innovation	**Process innovation**	**Technological innovation**
Project	48	397	1927
Temporary organization	no result	no result	no result
Construction industry	7	31	117

In the final step, the 37 relevant articles that had been identified were first examined separately and then combined and categorized into three groups: innovation definitions, innovation context and innovation management. These articles, organized in groups, were first used for my own sense making of the research field. Equally important for the study, the article groups helped identified areas of interest to explore further during the study, for example gaps in the literature. This helped to identify the research scope and research purpose, as explained in this thesis. An important gap that was identified was that clients' role for innovation had started to be explored but could be developed further, especially from a multi-project context as most researched had focus on either single projects or organizations. In this context, both clients as innovation supporters and clients' procurement strategies in multi-project contexts where identified as important to explore further. Especially a study of the combination of those, as clients' procurement strategies had been identified as an important tool to drive innovation in project-based settings (Eriksson, 2010a; Eriksson & Szentes, 2017).

3.3.2. Single-case study of Stockholm Royal Seaport

As mentioned earlier, this research project started as a continuation of a shorter study. Thanks to this, a first interesting case and initial relationships with key participants and empirical material was already established when the study started. The case, Case 1, is an urban development project in the outskirts of the City of Stockholm, Stockholm Royal Seaport. As the scope of my study was elaborated from both this case and the previous study's focus on clients' procurement strategies in multi-project contexts it was natural to start the gathering of empirical material in this case. The goal with conducting a single-case study in Stockholm Royal Seaport was to empirically explore client collaboration, their procurement strategies and how innovation might affect this.

To elaborate on the case, Stockholm Royal Seaport is one of Sweden's largest on-going urban development projects. When completed in 2030 it will consist of around 12 000 new dwellings and office space for over 35 000 people. It was initiated by the City of Stockholm, who also runs the project from start to finish. They have developed the project in sequential stages, each stage consisting of the City's infrastructure projects and around 8-10 parallel housing projects. The City allocates the housing projects to public and private developers (called clients in this thesis) through land allocation processes, with high prices on the land. All construction projects in each stage are located next to each other and they share infrastructure such as roads, site gates and storage areas. In other words, within each stage several interdependent clients execute their construction projects parallel driving significant need for collaboration, both between clients and also between their contractors.

Apart from the extensive collaboration, another complexity for the actors is the high sustainability goals established by the City, mainly in terms of environmental goals for the clients to fulfil. The combination of high prices for land, strict environmental requirements and the interdependent tight construction projects creates a complex multi-project context. These factors also leads to a great need for planning and organized collaboration between the actors, e.g. the City, clients, contractors, sub-contractors, including well-planned logistics and integrated supply-chains. To handle these complexities, the City have initiated a construction logistics center (called BLC), to be used as a tool to handle environmental, geographical and operational complexities. BLC has been in operation since 2013 with the aim to lower the environmental effect. All clients and their contractors are required to sign up for BLCs services, which includes material storage and consolidation, coordination meetings, follow-up on health and safety, on-site material handling, consultant services to plan project construction logistics. The complex multi-project context and coordinated construction logistics, through BLC, makes Stockholm Royal Seaport an interesting case to study. BLC is explored as an innovation as the model is new, both for the City and the other actors involved, and because it changes project execution processes within the urban development project. From a client perspective, both the complex context and the innovation for environmental sustainability lead to increased collaboration and a need to align procurement strategies to these aspects.

To conduct the single-case study, a combination of semi-structured interviews, meeting observations and document studies were performed. When this study started, 33 semi-structured interviews had been conducted by the master students and the senior researchers. In addition to this, I executed seven interviews from November 2016 to June 2017; a summary of all interviews included in the case study is shown in Table 3 including actors' organization and role.

The first 33 semi-structured interviews had varied focus including actors' usage and perception of BLC, clients' procurement strategies and the actors' general perception of working in Stockholm Royal Seaport. These interviews have mainly been used from an explorative angle and the broad spectra of material helped identify interesting gaps to dig deeper into. In paper 2 and 3, these interviews were used both for background knowledge and as the main empirical material for analysis. From these interviews the identified extension of the case study led to me conducting seven more interviews. These further interviews were more specifically focused on how BLC was implemented and used and how clients used their procurement strategies to handle the complex multi-project context and the innovation that is BLC, see appendix A for the interview guide used. These interviews of around one hour were recorded and transcribed to 3-4 page summaries, including relevant quotes which highlighted the participant's view of the discussed topics.

Beyond the interviews, four clients and construction management meetings were observed during 2017. These meetings covered general information of the overall project, specific issues that needed to be handled within the specific stage and attempts to coordinate between the clients' construction projects. Field notes were taken during the meetings, which were later digitally transcribed. During these meetings and interviews, some documents were mentioned, both information documents regarding BLC and contractual documents for the clients. Therefore, a continuous document study was executed in parallel to the interviews and the meeting observations. The findings in the documents have been used as background information in the case study and in later interviews as specific questions regarding the use of a certain document, especially the logistics plan. This document was a template which the City developed and made a contractual document for all clients to fill in and regularly update in coordination with their contractors. The logistic plan was developed to increase the awareness and usage of BLC, why the document was interesting to study within the research scope.

Table 3: Summary of interviews in the single-case study

No	Organization	Type of actor	Role
1	BLC	Operator	Coordinator
2	BLC	Operator	Site Manager
3	BLC	Operator	Site Manager
4	City	Public Client	Project Manager
5	City	Consultant	Coordination Manager
6	City	Public Client	Project Manager
7	City	Public Client	Senior Project Manager
8	City	Consultant	Procurement Manager
9	City	Public Client	Project Manager
10	City	Consultant	Client Support
11	City	Consultant	Logistics Consultant
12	Developer 1	Private Client	Project Manager
13	Developer 1	*follow-up interview with Project Manager*	
14	Developer 2	Private Client	Project Manager
15	Developer 3	Private Client	Senior Project Manager
16	Developer 3	Private Client	Project Manager
17	Developer 4	Public Client	Project Manager
18	Developer 4	Public Client	Procurement Manager
19	Developer 5	Private Client	Project Manager
20	Developer 6	Private Client	Project Manager
21	Developer 7	Private Client	Project Manager
22	Contractor 1	General Contractor	Construction Manager
23	Contractor 1	General Contractor	Site Manager
24	Contractor 2	General Contractor	Senior Construction Manager
25	Contractor 2	General Contractor	Project Manager
26	Contractor 2	General Contractor	Site Manager
27	Contractor 3	Infrastructure	Project Manager
28	Contractor 4	General Contractor	Construction Manager
29	Contractor 5	General Contractor	Construction Manager
30	Contractor 6	General Contractor	Construction Manager
31	Contractor 6	General Contractor	Site Manager
32	Contractor 6	General Contractor	Site Manager
33	Contractor 7	General Contractor	Site Manager
34	Contractor 7	General Contractor	Site Manager
35	Sub-contractor 1	Electrician	Site Manager
36	Sub-contractor 2	Infrastructure	Site Manager
37	Sub-contractor 3	Electrician	Site Manager
38	Sub-contractor 4	Ventilation	Site Manager
39	Sub-contractor 5	Ventilation	Site Manager
40	Sub-contractor 6	Electrician	Site Manager

Analysis of all the gathered empirical material in the case study was a continuous process, as is expected from an abductive study (Alvesson & Sköldberg, 2009). The material was first analyzed in an unsystematic way, to familiarize myself with the area. However, as more literature was covered and innovation was identified as an interesting angle, paper 2 was developed from a more systematic analysis of the empirical material using Pettigrew's et al. (1992) concept of receptiveness for change as a base for the analysis. For Paper 3 which focuses on the client collaboration and their procurement strategies, rather than BLC as an innovation, Eriksson (2015) framework of dimensions for partnering as supply-chain integration is elaborated on, by using Axelsson and Axelsson (2006) dimensions for inter-organizational collaboration to explore the material.

3.3.3. Multiple-case study of construction logistics models

The second empirical study, executed in parallel to the first, compares the findings from Case 1 regarding BLC with four other cases, with by industry identified coordinated construction logistics models present in the Swedish construction industry. Four cases, Case 2-5, have been included and analyzed together with Case 1 and they are presented in detail below. Empirical material from the cases consists of a varied combination of semi-structured interviews, workshops/seminar, meeting observations and document analysis, to construct a context-dependent understanding of the cases (Flyvbjerg, 2006). The questions explored during the material gathering were how the coordinated construction logistics models were initiated, implemented and used, what effects they had on work methods within projects and organizations and collaboration between actors, see appendix A for the interview guide used. In total I conducted eight interviews of around one hour. They were recorded and transcribed into summaries including relevant quotes and the participant's view of the discussed topics. The four cases include coordinated construction logistics models at two contractors, one large construction project developed by one developer with five parallel contracts, and one urban development projects, see Table 4 for an overview. The case study was conducted between December 2016 and November 2017.

Table 4: Summary of the cases and the gathered empirical material

Case	Data collection methods	Interviewees
Case 2 Contractor	Interviews, workshop	Logistics Manager 1 Logistics Manager 2
Case 3 Contractor	Interviews, workshop	Logistics Manager 1 Logistics Manager 2
Case 4 Construction project	Interview, documents	Senior Construction Manager Logistics Site Manager
Case 5 Urban development project	Interviews, meeting observations, documents	Logistics Manager Logistics Site Manager

Case 2 is a large Swedish contractor that has initiated and developed a model in-house, which focuses on material consolidation and transportation with detailed scheduled deliveries to sites. Their articulated goal is to increase the efficiency and safety on-site. The contractor offers the in-house model to all of their projects, but it is not mandatory to use. An internal logistics group is present in their largest projects and offer guidance to any project asking for help. The model was presented during a workshop between researchers and industry participants; afterwards interviews were conducted with two Logistics Managers.

Case 3 is a medium sized Swedish contractor owned by a larger Nordic contractor. The contractor has initiated, and with help from software planning tools, developed a material transportation strategy through consolidation and time slot deliveries to their sites. The in-house model was developed for two specific inner city projects and has grown from there into a separate subsidiary. The contractor offers their in-house model to all their projects, but only some use it, and they also offer it to their clients to use as a coordinated model between several contractors working on adjoining sites. This model was also presented during a workshop and follow-up interviews were conducted with two Managers at the logistics subsidiary.

Case 4 is a construction project initiated and owned by a large real-estate company. It consists of refurbishment and construction of five buildings with offices, hotels and a shopping mall and for the

real-estate company it is perceived to be unique and one of their largest projects. Due to the tight inner-city location and five different contractors working side by side the client with its project management team initiated a coordinated construction logistic model. They procured an operator to be in charge of transportation to the sites, create a common construction establishment for all contractors, rent out machinery etc. Material exploring this case has been gathered from one workshop and two interviews with a Senior Construction Manager and a Logistics Site Manager; contractual documents of the model have also been analyzed.

Case 5 is an urban development project next to a university in a large Swedish city, including 24 housing clients and their contractors. When the production of the first sites started, the municipality, that is the landowner and project initiator, together with a few clients realized the great need for coordination between all sites and their transportations. An operator was procured to develop and run a construction logistics center, to coordinate all transports, offer a short-term storage space and serve as coordination central between all actors on site. Most of the 24 clients or their contractors signed up for the services. The material gathering for this case was done through information and experiences presented during a workshop in combination with interviews with one Logistic Manager consultant from the municipality and the Logistics Site Manager of the construction logistics center.

As mentioned above, the analysis of the multiple-case study was done by comparing Case 1-5. An innovation perspective was used during the analysis and the coordinated construction models within each case where explored as different types of innovation according to Slaughter's (1998, 2000) definition of construction innovation from incremental to radical innovation. The findings from this analysis are described in detail in Paper 1.

3.4. Research quality and limitations

Research quality is often discussed from generalizability and verifiability; however, these concepts are more appropriate for quantitative research. For context-dependent qualitative research (Eisenhardt & Graebner, 2007) other parameters to discuss research quality is more useful, for example truth value, applicability, consistency and neutrality (Guba, 1981). By using different methods to gather empirical material *truth value* can be increased through triangulation (Patton, 1999; Yin, 2014), in other words ensuring credibility (Guba, 1981). In both empirical studies included in this thesis, i.e. the single-case study and the multiple-case study, several methods have been used to gather material. These different sources have created a possibility to compare the material and to discard or reinforce the findings. An illustrative example is the logistics plan template discussed in the single-case study. Discussions of this document first appeared during meeting observations and informal discussions with project management at the City in Case 1, they suggested that it was a tool to increase the usage of BLC. To explore this further, the document was studied in detail to create an understanding of its content. Based on this, questions regarding the document were included in interviews, with interviewees from the City, project managers at clients and employees at BLC. This process gave a more nuanced picture of the document and its effect on BLC, i.e. that it was not implemented within the construction projects even though it was a contractual document.

Applicability refers to the possibility of applying the findings in other settings (Guba, 1981). Applicability can be achieved through a clear line of reasoning, where other researchers are able to judge whether the findings can be transferred to other contexts. To achieve this, the appended papers are empirical heavy, as thick descriptions make the context understandable (Eisenhardt & Graebner, 2007). For this, it has been important to document the empirical material, which also leads to *consistency*. To achieve this, all interviews have been recorded and transcribed as summaries, to make the findings trackable and therefore increase the dependability (Guba, 1981).

For document studies and meeting observations, the continuous notes have been of great value to enable recollection of key parts of the meetings or documents. Furthermore, they have been useful as a foundation to draw conclusions. Moreover, working with empirical material, implies risks of potential biases from participants as well as from me as a researcher, both during gathering of material and the subsequent analysis. Openness to this bias enables *neutrality*; to minimize bias from participants, as they might be prone to bias within their professional role (Golafshani, 2003), several interviewees with the same role have been interviewed. In addition, triangulation will further limit this (Patton, 1999). Moreover, my views and interest can affect the findings and the participants can affect my views of the studied phenomenon. To be aware of this and have this in mind during the analysis has helped to keep an open mind during this process and therefore, hopefully, limited my potential bias.

As was touched upon above, the subjectivity in qualitative research is important to reflect on, so as to ensure research quality, however, as described by Czarniawska (2014), qualitative research is of great importance regardless of subjectivity as it provides rich material which is otherwise difficult to get access to. This is important when studying organizing between several interdependent actors as it can provide material describing the intricacies when implementing change into multi-project contexts. In this context, a limitation to achieving this understanding could be the sample size of the empirical material. Two points of guidance have been used here, firstly that a comprehensive picture is easier created from several cases rather than from one (Czarniawska, 2014) and secondly that information-richness is more important within the selected cases than the sample size (Patton, 1990).

To conclude this chapter on method and methodology Kvale and Brinkmann's (2014) metaphor that qualitative research can be conducted either from a travelers or a prospector's perspective is useful. In this metaphor, the traveler returns home telling tales and stories based on her own experiences and from those she met during her journey. The prospector, on the other hand, has tried to gather unsullied knowledge from unbiased questioning. I hope that it has become clear from this chapter that this study has applied a traveler's perspective to this joyful and developing process. The methodology described and the practice perspective influencing the study is in line with the traveler metaphor, where construction logistics as change and innovation in a multi-project context is explored from a contingency perspective to get a rich picture which would not have been possible if a rational perspective was applied. This also explains the prevailing understanding of the findings, which are described in the next chapter through summaries of the appended papers.

4. Summary of papers

The three appended papers are summarized in this chapter, including background, methods, findings and conclusions. The chapter ends with a short discussion on the integrative findings from combining the papers.

4.1. Paper 1: Coordinated construction logistics: an innovation perspective

Paper 1 explores coordinated construction logistics, which is an increasingly discussed concept in the Swedish construction industry. Coordinated construction logistics is defined from what the industry describes as models that are implemented to coordinate the logistics in construction projects. Construction logistics has mainly been analyzed from a rational perspective in existing research, focusing on how to improve the efficiency in the industry, from transportations, material usage, health and safety aspects etc. (Sundquist et al., 2018; Thunberg et al., 2017; Vrijhoef & Koskela, 2000). However, to understand industry change, such as implementation of coordinated construction logistics models, is it important to conduct explorative studies from different perspectives of the studied phenomenon. To discuss hinders and possibilities an innovation perspective is often used in construction research (Bankvall et al., 2010), with a focus on the fragmented interdependent actors. By taking an innovation perspective, the purpose of the paper is to suggest a different way to study coordinated construction logistics, namely as different types of innovation (Slaughter, 1998), to provide an alternative perspective of the phenomenon to increase the holistic understanding of it.

To explore this, the five empirical examples of coordinated construction logistics models were studied as a multiple case study, to understand potential drivers for implementing the models, how the models were initiated, implemented and used and what effects it had on work methods and processes. By adopting Slaughter's (1998, 2000) identified types of innovation in construction, incremental, modular, architectural, systemic and radical, the change in concept and change in link were explored for the five empirical cases.

From this, the findings suggest that coordinated construction logistics should not be seen as a fully embedded innovation in construction as the phenomenon have not been widely implemented from where methods and processes could be changed accordingly. Moreover, coordinated construction logistics should not be seen as one unified solution to increase on-site efficiency. From the findings, three different types of construction logistics models were identified, reflecting three types of construction innovation. These are company-based models, project-based models and system-based models. These models are found to be developed and implemented differently with different drivers. These models will also affect organizations, projects and systems differently with different objectives, such as facilitate collaboration, learning and innovation between inter-organizational actors and to lower environmental impact from the built environment.

Through these findings, the paper contributes to the supply-chain management literature by exploring construction logistics in a new way and by increasing the understanding of the phenomenon and highlighting other objectives than efficiency. The elaboration of the phenomenon adds to a more holistic understanding which can develop the field both theoretically and practically. The construction innovation literature should also be regarded, as conclusions in the paper are drawn on innovation implementation in inter-organizational contexts, and multi-project context for the system-based model. Where the findings indicate that inter-organizational innovation in a construction context requires a unified management, actor engagement and clear objectives to be implemented and embedded. A practical implication from the findings is the importance for management implementing coordinated construction logistics to understand their context and involved actors, as different models suit different organizations, projects and systems.

4.2. Paper 2: Users' influence on inter-organizational innovation: mapping the receptive context

Innovation in the construction industry happens mainly within single projects (Loosemore, 2015), research on construction innovation have also mainly taken a project perspective. Inter-organizational innovation in multi-project context, for example urban development projects, will have other possibilities to initiate and implement innovation (Bjerregaard, 2010; Cabrera & Cabrera, 2002; Levina, 2005), derived from the large complexity due to the many interdependent projects and actors (Lindgren & Emmitt, 2017; Winch, 1998). As the multi-project context and the many interdependent fragmented actors will affect inter-organizational innovation, it is of interest to explore how actors influence inter-organizational innovation in multi-project context. Due to the large number of actors involved in the construction industry, a narrow focus has been placed on the users of an innovation in an urban development project, namely on coordinated construction logistics models. Implemented as an enforced innovation and used by the clients and contractors. Why the purpose of the paper is to explore how users influence inter-organizational innovation by mapping the receptive context for change.

The receptive context for change, which is described in detailed in the chapter discussing the theoretical framework in this thesis, explores how receptive a context, e.g. projects, organizations, industries, is for change based on eight features that together can enhance the receptiveness for change (Pettigrew et al., 1992). The concept has been used to map the material from the single case study exploring clients', contractors' and sub-contractors' usage and perception of the implemented construction logistics center, BLC, in the urban development project. The center is regarded as an inter-organizational innovation as it implies new methods and processes for the actors in the case.

The findings show that the urban development project did not have a context receptive for change. Communication regarding the inter-organizational innovation was not sufficient during the development and implementation. The clients' procurement strategies did not facilitate for innovation to be used, to any significant extent, by the contractors or sub-contractors, which hindered them from planning their usage of the construction logistics center. Furthermore, the clients did not see themselves as innovation supporters; to a large extent they did not understand their role in the implementation process or the usage of the center. From a single project perspective, prior research has identified communication, long-term relationships, gainsharing and a common understand and aim (Cabrera & Cabrera, 2002; Eriksson, 2013; Gann & Salter, 2000) as influencers of implementation of innovation in construction. From the multi-project perspective applied in this paper the clients are identified to have a critical role for inter-organizational innovation. They control mechanism and activities that can influence the receptive context for innovation, and by that influence how innovation is developed in construction. The on-going discussion on clients' potential as innovation supporters (Ingemansson Havenvid et al., 2016; Kulatunga et al., 2011; Ozorhon, 2013) is echoed in the findings, where clients are in the position to support innovation but seems to lack capabilities or incentives. Tentative findings, which must be explored further with more clients, indicate that there are differences between different types of clients, e.g. ownership, size, timeframe.

The theoretical contribution from this paper is firstly that receptiveness for change is important for inter-organizational innovation in multi-project contexts. Furthermore, the findings add to the current discussion on clients in construction as potential innovation supporters. In a multi-project context, the findings indicate a difference between clients' support for inter-organizational innovation depending on their time perspective. Long-term committed clients, aiming to own and facilitate the building after production, showed more active actions to drive innovation. From a practical perspective, implications for the construction industry includes the importance on being aware of the receptiveness for change when initiating and implementing inter-organizational

innovation. Clients should understand the importance of communication and finding incentives for contractors and sub-contractors, for them to be able to plan their implementation of innovation. Here, procurement strategies should be mentioned as a tool that can drive innovation.

4.3. Paper 3: When you don't have your own block: Horizontal supply chain integration in multi-project contexts

Paper 3 discussed supply-chain integration in multi-project contexts. While supply-chain integration is widely researched in industries with mainly continuous exchange (Cao & Zhang, 2011; Flynn et al., 2010), e.g. manufacturing, it is less explored in project-based settings (Martinsuo & Ahola, 2010). The characteristics of a project-based setting including discontinuities, interdependent actors and uniqueness (Dainty et al., 2001; Eriksson & Pesämaa, 2012) makes supply-chain integration challenging (Lii & Kuo, 2016; Weingarten et al., 2016), and therefore of interest to explore. The knowledge gap has been explored by Eriksson (2015) developing a conceptual and practical framework for understanding partnering as supply-chain integration as a multidimensional construct. The framework has the following dimensions: strength, scope, duration and depth of integration and is applicable for project partnering and investigating single projects. However, the framework does not account for multi-project contexts with parallel projects and supply-chains. Since findings from single project context are not automatically applicable in multi-project context (Lycett et al., 2004) the purpose of the paper is to investigate how supply-chain integration can be achieved across projects within multi-project contexts.

To explore this, the single case study of the urban development project was analyzed, where the urban development project has sequential stages with multiple parallel projects within each stage. Clients in three stages were investigated, where focus was placed on the clients' strategies for handling inter-project interdependencies in a multi-project context. By analyzing the findings using Axelsson and Axelsson's (2006) dimensions for inter-organizational collaboration supply-chain integration is suggested as important across projects, not only within projects. Therefore, project interdependencies, such as spatiality, environmental requirements and coordinated construction logistics must be addressed for supply-chain integration in multi-project contexts. Eriksson's (2015) framework is therefore not sufficient to develop strategies for partnering in multi-project contexts. Beyond the four dimensions described in Eriksson (2015) another dimension should be added, which address interdependencies between projects, here called extension.

The theoretical contribution from this paper is the development of the multidimensional framework for partnering as supply-chain integration (Eriksson, 2015), by adding the extension dimension. This is added to include the interdependencies across projects in multi-project contexts, where clients must interact with each other. In other words, horizontal inter-organizational collaboration must be regarded, which can be more difficult to manage than vertical collaboration, since it normally lack the formal procurement and contract mechanisms. The findings show that these horizontal inter-organizational relations are informal and emerge organically from flexibility, openness and mutual interests. Practical implications include guidance for clients, i.e. municipalities and developers, on the importance of establishing informal horizontal inter-project collaboration. Additionally, procurement strategies should include parameters such as experience and skill in project coordination and collaboration to achieve this, for example how to communicate across project boundaries. Clients in multi-project context can be pro-active and facilitate for inter-project collaboration through creating forums to discuss and share knowledge between projects.

4.4. Integrative findings from the appended papers

This study has identified coordinated construction logistics as inter-organizational innovation present in the Swedish construction industry, where different models, with different developments and drivers, are present depending on their context. Inter-organizational innovation in multi-project context acts differently than in single projects. Furthermore, a unified management, actor engagement and clear objectives are found to be important in all settings to implement and embed inter-organizational innovation. Apart from this, in a multi-project context the clients are identified as a key actor to drive innovation and collaboration. A receptive context for innovation becomes important in this context, where clients can enhance the receptiveness as innovation supporters through communication and by using their procurement strategies as a tool.

Adding to the on-going discussion on clients as innovation supporters, the clients' time perspective for their projects and investment seems to matter in how active a role the clients will take for inter-organizational innovation in the multi-project context. From a supply-chain integration perspective, the multi-project context creates a need to regard interdependencies across project, e.g. spatial, common environmental requirements and coordinated construction logistics. In other words, clients must interact as collaboration becomes important. Whilst this interaction is often informal and organically developed with a need for flexibility, openness and mutual interest, their procurement strategies also become important for the interdependencies between projects. The procurement strategies should include requirements for experience and skills in inter-project collaboration. Pro-active clients, supporting innovation and collaboration, are suggested to create their own forums to establish the required communication and co-working. Based on these integrative findings a discussion on receptiveness for inter-organizational innovation and client collaboration will now be presented in the next chapter.

5. Discussion

The discussion presented in this chapter is based on the integrative findings from the studies included in the thesis and from the three appended papers. The discussion focuses on clients' role in inter-organizational innovation, in multi-project contexts, and how collaboration between clients is becoming increasingly important in this context. The findings are of interest as it will add to the knowledge on construction clients as innovation supporters and client collaboration in complex organizational settings.

5.1. Receptiveness for inter-organizational innovation

Clients' focus when riding their project life cycles is often to fulfil their project objectives, such as time, cost and quality, through their capabilities in initiating, planning and procuring for their projects. However, if a client's project takes place in a multi-project context, consisting of several parallel and sequential projects with different clients and contractors; other aspects must be taken into account. The projects and their actors become interdependent, and the outcome will depend on the level of successful collaboration across projects. The multi-project context requires a contingency perspective in order to explore the interdependencies between projects. A new dimension is required to understand construction projects, including inter-organizational collaboration and integration. Furthermore, if inter-organizational innovation is enforced, the aspects for the clients to conduct projects will change again and become even more complex. In this multi-project context, innovation that on a project level would be a production matter now becomes a client issue due to the required collaboration across projects. This context must be receptive for change (Pettigrew et al., 1992) so as to create flexibility and openness for inter-organizational innovation and collaboration.

5.1.1. Clients creating receptiveness

Receptiveness is concluded to be important for change and innovation in projects (Kulatunga et al., 2011; Pettigrew et al., 1992) and in this study it is also found to be important in a multi-project context. Furthermore, clients are identified as an actor with the possibility to affect the receptive context for inter-organizational innovation. The loosely-coupled (Dubois & Gadde, 2002) multi-project context with fragmented actors (Winch, 1998) and organizational variety (Lindgren & Emmitt, 2017) creates unstable conditions for innovation. Organizational settings are seen as partly stable and partly constantly changing (Tsoukas & Chia, 2002). Change and innovation are suggested to come from learning and the unknown (Edmondson, 2012) but also from stable routines (Feldman & Pentland, 2003). If a multi-project context is an unstable organizational setting, it will affect innovation. If a combination of embracing learning and creating routines is necessary for change and innovation then actors in multi-project context must create this balance. That is suggested to be done through a receptive context, where the clients' key role becomes important.

Looking at Pettigrew's et al. (1992) suggested features to create a receptive context (see Chapter 2), clients in construction could enhance several of them. Clients are suggested to create receptiveness by being present, creating the right amount of pressure on their contractors, building inter-organizational networks, establishing clear goals and aligning innovation and context. From the empirical findings in this study, clients have used some of these actions but some seems to be missing. Increased actions from the clients might increase the usage and implementation of the studied inter-organizational innovation. To be present, clients must take time and understand the innovation, not push it to their contractors as is exemplified by one client's Project Manager in Case 1: "*We are not a company that can produce a logistics plan, our contractors have that competence*". Clients should rather try to simplify the work process for the contractor, where it is possible. One example of this was found in Case 1 were two clients collaborate over their

procurement strategies in order to find one common contractor for both of them, which would simplify their processes as next door neighbors.

This inter-project collaboration will also help create informal networks, from where collaboration over inter-organizational innovation can spread beyond the formal client meetings held by the City. To create clear goals, the findings suggest that information should be communicated from start, contractors indicate that *"at our firm no one knew how it worked"* (Supervisor, Sub-contractor, Case 1) and that they were *"concerned and hesitant"* (Site Manager, Contractor, Case 1). By including information in tendering documents regarding innovation, contractors can plan for their change processes and also communicate to their sub-contractors. To align innovation and context, partnering has been suggested (Eriksson & Szentes, 2017; Ingemansson Havenvid et al., 2016) in order to create incentives for the contractors to use and implement innovation which is also found to be important in the findings. However, apart from a few clients this has not been used in the studied procurement strategies. This is an interesting aspect of how clients can incorporate incentives for innovation into their procurement strategies which should be explored more in multi-project contexts.

5.1.2. Clients as innovation supporters through procurement strategies

In the multi-project context clients as innovation supporters must account for other aspects than those important within single projects. Clients have been identified as risk averse (Loosemore, 2015) and self-protective (Van Duren et al., 2015). These characteristics should not take the upper hand when implementing inter-organizational innovation in a multi-project context, because it will hinder the collaboration between projects and clients. Instead, clients must focus on creating a receptive context where they can communicate innovation within and between projects. The findings show that procurement strategies can be used as a tool to create receptiveness, where clients collaborating between each other during planning and procurement can create a context for their contractors to implement and embed innovation. When innovation is enforced as inter-organizational innovation in a multi-project context the clients must be able to communicate (Eriksson, 2013; Gann & Salter, 2000) the innovation to their contractors, sub-contractors and suppliers. When the innovation is related to production, it is not the client that will be the user of the innovation, but rather it will be the contractors. Still, clients must understand the innovation to be able to implement it in their projects; in this sense, clients will become indirect users. While in a single project context the clients would not become involved in the innovation process, they must here take charge of it. Through procurement clients can in a contractual way communicate innovation and apply incentives for implementation and usage. Figure 2 illustrates how these relations look between the indirect and direct users and where procurement strategies become important to implement inter-organizational innovation.

In single projects, partnering is suggested to enhance innovation (Crespin-Mazet et al., 2015; Eriksson, 2010a), however, in a multi-project context, project partnering is not enough. Parallel projects must be aligned towards the same goals, starting already during the planning. Clients collaborating on their procurement strategies are able to align their goals, which entails that clients must take a proactive stand for innovation. Here, findings indicate that long-term committed clients are more willing to take such risks and be proactive towards collaborating over innovation. These findings should be further explored, including how and why long-term committed clients take an active stand for innovation.

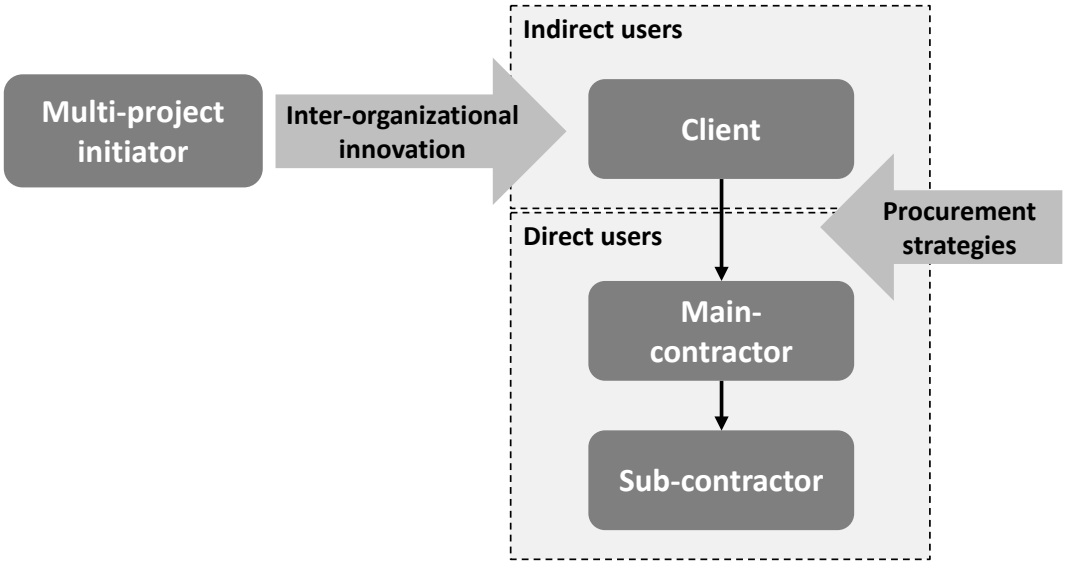

Figure 2: Illustration of relations between indirect and direct users

5.2. Clients' inter-project collaboration

In urban development projects, as an example of a multi-project context, the housing clients do not chose their neighbors. The initiator, often a municipality, decides who should build on what site and which clients should share a road, a garage or a backyard. As touched upon earlier, this creates additional complexities in executing projects than those present in a single project that is built individually. The vertical relationships between clients and contractors are steered through contracts and in complex projects collaboration through partnering is suggested (Alderman & Ivory, 2007; Dainty et al., 2001). When horizontal relations between clients become important there are no formal or standard contractual relations that can guide the collaboration. If no actions are taken, the urban development project must rely on informal horizontal collaboration.

Tentative findings indicate that clients acting in multi-project contexts must account for several additional aspects when executing their projects than projects performed in isolation. From the five cases included in the study, four such aspects have been identified based on participants' focus areas during interviews and meeting observations. The four identified aspects have been discussed at length by the participants, often as new constraints for the specific project discussed which has not been seen in less complex projects. Figure 3 summarize the four identified aspects; spatiality, time, requirements and innovation. The first aspect is regarding *spatiality*. In an isolated project the main spatial issue is the projects sites (Engwall & Jerbrant, 2003), but in a multi-project context this site is next to another parallel project's site, often sharing some common areas such as garage or backyard. This will affect the clients' planning, design and procurement in terms of demarcations between projects; who should do what and who should own what. It will also affect the on-site production, in Case 1 a widely discussed issue was the coordination of all construction cranes so as not for them to collide. In long-term, spatial aspects will also affect real-estate management since contracts for shared spaces must be established and maintained, for example for facility management. The second aspect is *time*, because when projects are performed in parallel, their time plans must of course be coordinated. For the clients, this work should start already during their project planning as the time plans become increasingly difficult to change the longer the projects has run (Dubois & Gadde, 2002; Taylor & Levitt, 2007). Coordination around order and priority must be planned between clients and during production and must be continuously followed up on. Another time aspects is the completion time, for example if all parallel housing projects are

completed at the same time their dwellings will come out to the market at the same time, which could affect the supply and demand balance.

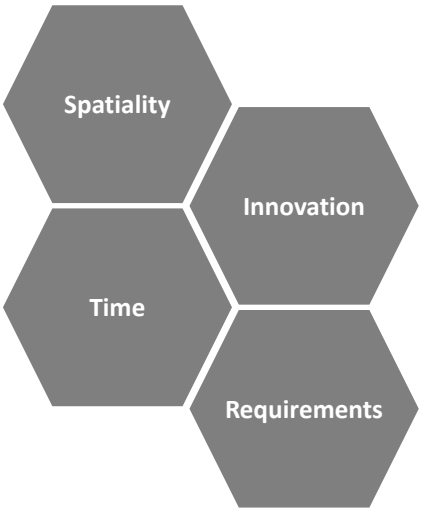

Figure 3: Illustration of aspects affecting client collaboration in multi-project contexts

In a multi-project context, there is often an initiator and in urban development projects a municipality often has this role. This initiator will stipulate certain *requirements* for the projects, which is the third aspect. The requirements could span from quality and timeframe to environmental, some of these are of course present also in single-projects. However, some requirements lead to inter-project collaboration, for example health and safety requirements. If projects are performed next to each other using the same roads for transportation, their health and safety work will overlap. In Case 1, 4 and 5 this is handled through joint site meetings and visits during production, where the contractors comment and help each other. The last aspect, often stemming from the initiator, is *inter-organizational innovation*. In construction, this is often in the form of new processes such as coordinated construction logistics, the example in this study. This is elaborated on above, but from a collaboration perspective, innovation seems to increase the need for communication and inter-project networks in order to implement and embed the innovation in the whole context.

The aspects presented above should be seen as tentative as further studies are needed to explore client collaboration in multi-project context, to reinforce the findings and possibly find other aspects. The continued study of this area should focus on client collaboration, possibly from an inter-organizational relations perspective. These aspects have been included anyway as they highlight the importance of inter-project collaboration and how multi-project contexts will create different constraints for the construction projects. This will further be elaborated on in the next chapter discussion suggestions for further research, as well as theoretical contributions and practical implications.

6. Conclusions

6.1. Theoretical contributions and practical implications

By examining the multi-project context of urban development, the purpose of this study has been to explore the clients' role when inter-organizational innovation is present to drive sustainable urban development. This is an important area to study as urbanization and climate change put greater and greater pressure on our built environment. Clients have been identified as an important actor in leading and supporting both change and innovation (Ingemansson Havenvid et al., 2016; Loosemore, 2015) that can increase sustainability by changing the construction industry. Clients can use their procurement strategies to implement innovation (Eriksson & Szentes, 2017) and this thesis has explored the usage of procurement strategies in a multi-project context to guide innovation and collaboration both vertically and horizontally.

The theoretical contribution of this thesis could be seen as threefold. Firstly, by aiming to elaborate on the empirical phenomenon of coordinated construction logistics, by applying a contingency perspective and, along the course of the study identifying it as innovation, the findings contribute to research on construction logistics in supply-chain management and operational management. In appended Paper 1, instead of taking a productivity and efficiency perspective applying innovation theory (Slaughter, 1998, 2000), the findings have shown other objectives to be important for the industry when using coordinated construction logistics. Collaboration between projects and actors, to drive innovation and increase sustainability, has been identified as important objectives. It was also found that depending on context, construction logistics models will have different impact depending on what the model sets out to change and how (and how much) it will affect its given context. Coordinated construction logistics applied within a single contractor is not entirely comparable to a model implemented in an urban development project, which will face innovation implementation in an open system, i.e. a multi-project context.

The second contribution is added knowledge to the discussion on clients' potential as innovation supporters in the construction industry. Previous focus has been on whether clients have the right capabilities and incentives to support innovation in projects and organizations. As this study has focused on multi-project contexts, several different clients within the same context have been studied and comparison between those made possible, which is described in detail in appended Paper 2. One conclusion is that different clients respond differently to enforced inter-organizational innovation to be implemented through them, in and between their projects. While some clients appear to be risk averse and prefer well-tested and established processes, others are more proactive in using and implementing innovation. The identified differences between different types of clients were mainly their time-perspective. Those clients that had a short project perspective, e.g. selling the building after completion, were more risk averse, whilst clients with a long-term perspective tried to actively incorporate innovation within their projects.

The multi-project context also implies an increased number of involved actors from different organizations working in interdependent projects (Engwall & Jerbrant, 2003). A third contribution from this thesis is the exploration of collaboration between projects, and especially clients, in such a context. Appended Paper 3 identifies an added dimension for clients to consider when choosing procurement strategy in a multi-project context, which is the horizontal extension between the projects. In other words, how much collaboration is needed with parallel and sequential projects? The study as a whole has also concluded some tentative findings regarding what aspects the horizontal collaboration between interdependent clients must take into account. Based on the empirical findings, spatiality, time, requirements and innovation are all aspects that become increasingly important for collaboration in a multi-project context. Therefore, one suggestion is that clients need to be flexible, open and have mutual and aligned interest in order to be able to

collaborate in these contexts. These findings should be further explored in future studies including more clients from different multi-project contexts. This will be elaborated on below, where suggestions for future studies is discussed.

If we turn to practice, and especially the construction industry, the thesis presents some practical implications from this study. First of all, the thesis highlights the importance of knowing your context when initiating and trying to implement inter-organizational innovation such as coordinated construction logistics. For example, the chosen model should reflect the objectives and dynamics of the system in which it is implemented. For coordinated construction logistics, different models suit different organizations, projects and systems. For implementing inter-organizational innovation it is also important to regard the receptiveness, to establish support in the system for innovation. This includes how to communicate and create incentives for those who are to use the innovation. Here clients' procurement strategies should be seen as a tool to establish communication channels and create incentives. In a multi-project context, the clients must also establish inter-project networks to collaborate between parallel and sequential projects. This must often be done informally and it was found that clients who were proactive and established relationships with neighbors by themselves could easier collaborate during the project process, for example by aligning their procurement strategies to choose the same contractor which would decrease spatial and time related obstacles.

Furthermore, in addition to the implications being valuable to clients, in the form of developers, they can also be of value to other actors working with these clients. For municipalities, initiating urban development projects, understanding how clients can affect inter-organizational innovation and how they collaborate can be useful when initiating and planning urban development and employing different developers. It can guide them through the increased complexities occurring when many actors and organizations come together in one urban development project. On a single-project level, the findings can increase the awareness for procurement managers to account for inter-organizational innovation and the required collaboration stemming from it when procuring in a multi-project context, such as an urban development project.

6.2. Suggestions for future research

From the study presented in this licentiate thesis several directions for future research could be discussed. The focus here will be on possibilities to elaborate on client collaboration in multi-project context, which will also be my primary focus in the second half of my PhD project. Some tentative findings regarding client collaboration in multi-project context is presented in the discussion. These findings are of interest to explore further, as client collaboration is deemed interesting in both research and practice. The built environment is becoming more and more complex with increased requirements on for example sustainability in combination with more complex project processes with parallel and sequential projects interrelating, leading to a need to study client collaboration in practice. From a research perspective the knowledge field of inter-organizational relationships is of interests, as organizations are often not successful in isolation (Rossignoli & Ricciardi, 2015). A continuous study could both add a project perspective and present rich empirical material from client collaboration in a multi-project context from the complex project-based construction industry.

Based on observations made in the project office in Case 1, and from meetings observed, I have found a discrepancy between how clients are presumed to work together when an urban development project is initiated and how they actually do work and collaborate during the project life-cycle. In my Swedish empirical example, the City's urban planning office was responsible for initiating the urban development project and allocated land to different clients. To simplify, they decide how the housing blocks should look, which buildings that should share for example garage or

backyard, which block should be built when and which client should construct what building. They both set the rules of the game and lay out the playing field; deciding how and with whom clients must collaborate. However, this does not take into account the clients' project execution and to what extent and over what they actually have to collaborate on.

The urban planning office, by necessity, has a broader view of all the development stages with many blocks that should look good for the city and work during their lifetime. Therefore, they hand over the collaboration and responsibility to actually finish the projects to the clients. Therefore it would be interesting to further explore how clients actually collaborate to complete these complex projects with high requirements, often including innovation and spatial and time constraints. With guidance from practice theory (Nicolini, 2012; Schatzki et al., 2001) a suggested continuation of the study is to explore how clients actually collaborate in multi-project contexts, when they are required to work together in some undecided way. Apart from creating practical guidance for how clients collaborate in this context it could add knowledge to the inter-organizational relationships literature, by exploring the rich empirical material from a practice perspective.

7. References

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8. Appendix

8.1. Appendix A, Interview Guide

Date, time, location

Background information
Name
Organization
Project
Role

Presentation of research project
Research project at large
My background
Area of interest

Examples of general guiding questions
Challenges in the role
Project background, progress, challenges
Work for change/innovation within organization and project, changes over time
Collaboration within the project, between actors
Collaboration between organizations projects
View on change/innovation in the construction industry, changes over time
Construction logistics, what is it, do you use it
How does construction logistics look in the project, opportunities and challenges
Why coordinated construction logistics, potential development
Coordinated construction logistics in the project organization

Examples of guiding questions for different roles
Initiators of innovation (e.g. municipalities)
Initiation, development and procurement of coordinated construction logistics
Changes and development over time
Learning and knowledge sharing
Reactions from users

Indirect users (e.g. clients/developers)
Reactions on coordinated construction logistics
Horizontal and vertical communication
Procurement in relation to construction logistics and collaboration
Differences between this project and your other projects

Users (e.g. contractors)
Understanding and usage of construction logistics, reactions and opportunities
Horizontal and vertical communication
Relationship with other actors, e.g. client and sub-contractors, based on construction logistics
Opportunities and challenges with coordination and collaboration with other actors