

Procurement strategies for enhancing exploration and exploitation in construction projects

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strategies for
enhancing
exploration

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Received 3 May 2016
Revised 9 July 2016
9 August 2016
Accepted 9 August 2016

Abstract

Purpose – The purpose of this study is to investigate how procurement strategies may be designed to facilitate exploration and exploitation in construction projects.

Design/methodology/approach – This paper is based on a literature review of organizational research and construction management literature together with a brief interview study of Swedish clients and contractors.

Findings – The theoretical and empirical findings propose that small and simple projects with low uncertainty and scarce resources may focus on exploitation to enhance short-term efficiency through traditional procurement strategies including delivery systems that separate the actors and their activities (i.e. pure design-build- or design-bid-build-contracts), fixed price payment and price focus in bid evaluation. Large complex projects with high uncertainty and customization benefit from combining exploration and exploitation to enhance sustainable performance. This requires collaborative procurement strategies including joint specification through early contractor involvement, cost reimbursement coupled with incentive-based payment, bid evaluation based on multiple criteria and collaborative tools and activities in partnering arrangements.

Research limitations/implications – This paper contributes to organizational learning literature by pinpointing the need for integrating procurement strategies that enhance combination of exploration and exploitation. The main contribution to the construction management literature involves the investigation of how procurement strategies may affect exploration and exploitation, as identified and articulated in the propositions developed in this paper.

Practical implications – From a practical perspective, the findings highlight the importance of tailoring procurement strategies to project characteristics to enhance a suitable balance between exploration and exploitation in construction projects.

Originality/value – The explicit focus on the operational project-level is uncommon but relevant in organizational learning literature.

Keywords Partnering, Exploration, Exploitation, Construction procurement

Paper type Research paper

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The author gratefully acknowledges the financial funding received from the Swedish Research Council Formas and the Swedish Competition Authority, which made this study possible.



Introduction

Prior organizational research has highlighted the importance of exploiting existing knowledge and technologies to obtain efficiency currently while also exploring new knowledge and technologies to innovate and adapt for future demands (Gupta *et al.*, 2006; O'Reilly and Tushman, 2013). Accordingly, both explorative and exploitative learning are critical for achieving sustainable performance based on both long-term innovation and short-term efficiency, but companies struggle to achieve them both (March, 1991). Largely, prior research has reached consensus about the importance of exploration and exploitation, whereas there is a lack of understanding of how these two learning modes can be combined and achieved (Gupta *et al.*, 2006; Simsek, 2009). Past studies on exploration and exploitation have mostly concerned firm-level or business unit level (Jurni *et al.*, 2013). However, studies concerning projects and inter-organizational relationships are scarcer (Tiwana, 2008; Jurni *et al.*, 2013). Hence, although combining both exploration and exploitation is important also in project-based contexts (Söderlund, 2008; Turner *et al.*, 2014), there is limited knowledge of how to enhance and achieve this learning combination at the operational project level (Turner *et al.*, 2015).

In the construction industry, most work is executed in inter-organizational projects. The challenges of combining short-term efficiency and long-term innovation are critical in this empirical setting (Bygballe and Ingemansson, 2014), due to:

- scarce resources, decentralization, and short-term focus on performance in individual projects;
- interdependences among many participating actors and their activities; and
- long lifecycle of the built assets and the importance of long-term survival of the firms involved.

It is, therefore, not surprising that the construction industry often is criticized for both efficiency-related problems, in terms of defects and poor time/cost performance in projects (Assaf and Al-Hejji, 2006; Shehu *et al.*, 2014) and innovation-related problems, in terms of reluctance to change and lack of technology development (Tawiah and Russell, 2008; Bosch-Sijtsema and Postma, 2009). Combining exploration and exploitation thereby seems central to handle the tension between short-term project management and long-term asset management. However, combining exploration and exploitation is especially important in large and complex projects, where tight time and cost constraints require efficiency, whereas complexity, uncertainty, customization and uniqueness require innovation and adaptation (Eriksson, 2013; Turner *et al.*, 2014). In small and simple projects with short duration and scarce resources the need and possibilities for slow explorative learning are less apparent. Due to their simplicity, certainty, standardization and similarities, fast exploitative learning based on utilizing and fine-tuning existing knowledge and technologies is more suitable in this type of projects.

Prior organizational research has shown that governance- and management-related processes and systems, such as organizational structure, resource allocation and reward systems, influence exploration and exploitation (O'Reilly and Tushman, 2008; 2011; Jansen *et al.*, 2008). In inter-organizational project settings, procurement strategies set the stage for these different types of management and governance systems and thereby fundamentally affect the possibilities to combine short-term efficiency and long-term innovation (Eriksson, 2013). Although prior construction management research has studied how procurement and contracting affect either short-term efficiency aspects (Tam and Tam, 2008; Hampton *et al.*, 2012; Olaniran, 2015) or long-term innovation (Tawiah and Russell, 2008; Bosch-Sijtsema

and Postma, 2009), there is a lack of studies explicitly investigating both aspects. Hence, it is of strategic importance and societal relevance to improve our understanding of how procurement strategies may be utilized to enhance exploration and exploitation in inter-organizational projects.

Accordingly, the purpose of this study is to investigate how procurement strategies may be designed to facilitate exploration and exploitation in construction projects. Because differences in project characteristics require different procurement strategies (Bajari and Tadelis, 2001; Eriksson, 2008), this paper investigates procurement strategies for two main types of projects:

- (1) small and simple projects with low uncertainty, where a strong focus on exploitation can enhance short-term efficiency; and
- (2) large and complex projects with challenging circumstances that require a combination of exploration and exploitation to enhance both short-term efficiency and long-term innovation.

The study is based on a literature review and a brief interview study of Swedish clients and contractors, which are combined to develop testable propositions about procurement strategies and their consequences for exploration and exploitation in construction projects.

Frame of reference: procurement effects on exploration and exploitation

The literature review included both organizational research on exploration and exploitation and construction management research on how procurement affects various aspects related to exploration and exploitation. The literature review focused on four procurement and governance-related aspects that were discussed in both literature fields: cross-functional integration and type of delivery system, reward systems and incentive-based payment, staffing and partner selection and social interaction and partnering.

Exploration and exploitation

Exploration and exploitation originates from organizational learning literature, where the two concepts represent two fundamentally different learning modes. Exploitation is related to rapid learning, control and constraints, continuous improvement and short-term efficiency and alignment, whereas exploration concerns slow learning, flexibility and creativity, risk taking and long-term innovation and adaptation (March, 1991; Gibson and Birkinshaw, 2004; Andriopoulos and Lewis, 2010).

Due to their inherent differences, these learning modes are difficult to combine, especially in organizational settings with scarce resources (Gupta *et al.*, 2006). Prior research suggests two main ways of combining exploration and exploitation, either through separating or integrating mechanisms (Raisch *et al.*, 2009; O'Reilly and Tushman, 2013). Past firm-level studies often describe successful separation strategies where exploration and exploitation can be achieved by sequential separation in time and/or structural separation in space (Tushman and O'Reilly, 1996; O'Reilly and Tushman, 2008). Recently, however, some studies pinpoint the importance of integrating exploration and exploitation to reap synergies from them (Gibson and Birkinshaw, 2004; De Clercq *et al.*, 2013). Other studies also suggest that separating and integrating strategies are complementary and may be combined (Raisch *et al.*, 2009; Andriopoulos and Lewis, 2010).

Cross-functional integration and type of delivery system

There is much organizational research on the separation vs integration of different types of actors/competences in development work and how that affects the possibilities for exploration and exploitation. Several studies emphasize the benefits of integration of cross-functional competences for exploration. In a quantitative study of 155 US firms, [de Visser et al. \(2010\)](#) found that cross-functional teamwork enhances exploration because high uncertainty produces interdependencies that are best dealt with through cooperation among different actors with diverse competences. Similarly, [Knudsen and Srikanth \(2014\)](#) showed in a simulation study that explorative learning is better performed jointly by multiple specialists with different types of functional knowledge and experiences, as their mental models can be aligned and their mutual confusion be lowered. Likewise, [Gupta et al. \(2006\)](#) and [Andriopoulos and Lewis \(2010\)](#) suggest that work in heterogeneous teams with diverse competences and experiences enhance exploration, whereas homogeneous teams enhance exploitation.

Another group of studies finds that cross functional integration is beneficial for combining exploration and exploitation. In a study of 42 innovation projects, [Tiwana \(2008, p. 255\)](#) found that knowledge integration, in terms of “jointly applying specialized knowledge held by various project partners”, improved both explorative and exploitative project performance. In addition, [Jansen et al. \(2009\)](#) claim that cross-functional teams enable knowledge exchange across exploratory and exploitative activities and units. Similarly, [Simsek \(2009\)](#) suggests that collaboration among heterogeneous partners with diverse competences and experiences enhance the combination of both exploitation and exploration.

The abovementioned studies indicate that homogeneous teams improve exploitation and that heterogeneous cross-functional teams enhance either exploration or a combination of exploration and exploitation. That the two groups of studies have come to somewhat different conclusions is not unexpected, as they have investigated many different empirical settings. [O'Reilly and Tushman \(2013\)](#) highlight this aspect by emphasizing the importance of applying different strategies (separation vs integration) for different contexts. Several scholars mean that combining exploration and exploitation through cross-functional integration is especially suitable at the project-level due to scarce resources ([Gupta, et al., 2006](#); [Tiwana, 2008](#); [O'Reilly and Tushman, 2013](#)). Hence, in the context of large and complex construction projects, cross-functional teams are likely to enable a combination of exploration and exploitation, in accordance with the second group of studies.

In the construction management context, the separation vs integration of different types of actors/competences in development work is largely affected by the delivery system; design-bid-build (DBB) or design-build (DB). Traditionally, DBB involves a separation of design and production as the client and their consultants perform detailed design before the contractor is involved to execute production. One advantage of DBB-contracts is that a competent and experienced client more easily can ensure that they get the quality they want by specifying the design in detail ([Cheung et al., 2001](#)). When a certain level of quality is critical, DBB-contracts may be preferable if the client has sufficient expertise and experience to know what he wants and how to achieve this. A disadvantage is that the client's detailed specification reduces the contractors' opportunities for innovation; there are simply not that many technical aspects to develop. Furthermore, DBB-contracts hinder innovation due to lack of joint problem-solving and lack of a holistic perspective on design and construction ([Korczyński, 1996](#); [Eriksson and Westerberg, 2011](#)). The usual separation between planning and production also reduces the learning between the actors in the different stages ([Styhre et al., 2004](#)), which can extend the duration of the project and reduce the

constructability. The absence of contractors' production knowledge during the design stage could thus impair the efficiency during the production stage, especially in more complex projects.

When procuring DB-contracts, contractors are involved early and responsible for detailed design work. This can promote greater exchange of knowledge between consultants and contractors, which can lead to product design with improved constructability because contractors' production experience is exploited during the design stage. DB-contracts also mean that the contractor can start building before the product is completely specified in detail, which saves time (Cheung *et al.*, 2001). A disadvantage of traditional DB-contracts can be that the client may not get exactly the product quality he demands, as the client is not involved in the design stage. This challenge is especially apparent in large and complex projects with high uncertainty, where it is difficult for the client to know what he wants and specify the functionality accordingly. From an innovation perspective, the effects of a DB-contract are more obscure. DB-contracts improve the contractor's possibilities for innovation but there may be a lack of incentives. When DB-contracts are procured based on traditional competitive tendering focusing on the lowest price, the contractor has no clear incentive to spend time and money on explorative development (Ahola *et al.*, 2008). To minimize the risk of exceeding tight time and budget frames, the production is rather based on known solutions and existing knowledge. Accordingly, although the delivery system affects the possibilities for exploration and exploitation, it is important to address the incentives to perform innovation work, which are more strongly affected by reward systems and partner selection.

Reward systems and incentive-based payment

Reward systems are another central governance aspect, serving as integrating or separating mechanisms, thereby enhancing both/either exploration and/or exploitation (March, 1991; Gibson and Birkinshaw, 2004). The reviewed literature has produced similar findings about rewards in different contexts. In a multiple case study of 15 firms, O'Reilly and Tushman (2011) found that common fate reward systems enable the combination of exploration and exploitation. Similarly, in a quantitative study of 305 senior team members in a large European financial services firm, Jansen *et al.* (2008) found that contingency rewards related to overall performance enhance a combination of exploration and exploitation. Furthermore, in a quantitative study of 232 Canadian firms, De Clercq *et al.* (2013) found that the positive effect of combining exploration and exploitation is strengthened in firms using common fate reward systems. Hence, in organizational research, there is a consistent view that actors should be paid through contingency rewards based on overall collective performance, rather than for the results of their particular units, to enable the combination of both exploration and exploitation (O'Reilly and Tushman, 2008).

In construction projects, the two main reward systems are fixed price payment and cost reimbursement. There are also intermediate alternatives, based on cost reimbursement coupled with incentives, fixed contractor fee and/or bonuses. The most common reward system is fixed price (Eriksson, 2008). By procuring a contractor through competitive tendering based on a fixed price the client wants to receive the market's lowest price. But in practice, this assumes that the tender documentations and specifications are both flawless and exhaustive, something that is often very difficult and costly to achieve, especially when the conditions are not fully understood due to high complexity and uncertainty. Bajari and Tadelis (2001), therefore, claim that fixed price is appropriate in simple projects with low uncertainty where the product is easy and inexpensive to describe and design. This type of payment does not involve any economic incentives for joint problem solving and

development, as the contractor will take all profits from cost efficient solutions. Another disadvantage is that the contractor has no incentive to deliver added value in the form of higher quality than promised (Ballebye Olesen, 2008). Fixed price is also inappropriate when innovation is demanded. This is because developing and implementing something new means high uncertainty and in fixed price contracts contractors rather exploit proven methods to minimize risks.

In contrast, pure cost reimbursement means that the contractor receives payment for all costs incurred, which decrease the risk for the contractor (Korczyński, 1996; Bajari and Tadelis, 2001). The contractor then has no reason to make more effort than necessary to carry out the work, which is negative for cost efficiency. Nor is there any incentive for development as innovative cost savings only leads to reduced compensation. Nor can quality-enhancing innovations lead to higher profits, only cost recovery. Due to these drawbacks, cost reimbursement is often coupled with economic incentives, where the actors share gains and pains, for example, at 50/50 basis, when the real costs differ from the target cost. Incentive-based payment is particularly suitable for early procurement of contractors and joint specification (Chan *et al.*, 2007), as it provides collaborative project stakeholders a common fate reward for gains due to innovative technologies and efficient improvements. A disadvantage of incentive-based payment is that rules on adjusting the target cost tends to be rather complex contractual terms that often give rise to discussions or even disputes (Kadefors, 2004; Badenfelt, 2008; Boukendour and Hughes, 2014). It has therefore become increasingly common to abandon the usual type of economic incentive connected to a target cost and instead uses a fixed contractor fee, covering profit, risk and central administration. When using a fixed fee, the contractor will get cost reimbursement for the direct operating costs, but the absolute value of the profit is fixed from the outset. The fixed fee provides the contractor with incentives for cost-saving efficiency and innovation as reduced operating costs will lead to a larger profit margin. A third alternative is to link bonuses to non-economic aspects, such as quality, timeliness, work environment and environmental impact (Tam and Tam, 2008; Eriksson and Westerberg, 2011; Love *et al.*, 2011). The contractor can then receive monetary bonuses if certain levels of different functional requirements are exceeded, providing incentives to deliver better than any specified minimum levels.

Staffing and partner selection

The selection of staff and partners that will conduct the explorative and exploitative work is also central. Although this aspect is somewhat neglected in prior literature due to lack of studies on individual and inter-organizational levels, supply chain management and partner selection techniques are important for improving a capability of combining both exploration and exploitation (Kristal *et al.*, 2010). More explicitly, it is important to select partners and staff that are capable of performing both learning modes to enable a combination of exploration and exploitation (Andersson and Johansson, 2010; Andriopoulos and Lewis, 2010). In a quantitative study of 337 US firms, Lavie and Rosenkopf (2006) found that partner selection resulting in new partners enhances exploration, whereas working with existing partners enhances exploitation. However, it is not only which partner you select that is of importance but also how the selection is conducted matters. The partner selection process and its selection criteria set the basis for the inter-organizational relationship, in terms of risk and resource allocation, collaboration and competition, which have major impact on exploration and exploitation. This is because long-term adaptability and exploration require risk taking (Andriopoulos and Lewis, 2010), whereas risk aversion drives exploitation, as the outcomes of exploitation are more proximate, certain and immediate (March, 1991; Lavie *et al.*, 2010). In a quantitative study of 240 firms in the Dutch

metal and electrical engineering sector, [Sidhu et al. \(2004\)](#) found that slack monetary and human resources enable exploration. Furthermore, in project contexts, cost and time constraints hinder explorative learning ([Andersson and Johansson, 2010](#)).

In construction projects, selecting capable contractors is a critical task for clients ([Kumaraswamy and Anvuur, 2008](#); [Caldwell et al., 2009](#)). Partner selection is carried out through bid evaluations that can be focused on lowest price or on multiple criteria. In the Swedish construction industry, lowest price is the most important bid evaluation criterion, especially among public clients ([Kadefors, 2005](#); [Eriksson, 2008](#)). A disadvantage of price-focused evaluations is that they mostly lead to new teams constantly being formed, reducing the possibility of exploitative learning and continuous improvement across projects. In addition, focus on lowest price generates an emphasis on short-term benefits by taking into account investment costs rather than long-term life cycle costs and innovation. Lowest price selections also reduce contractors' incentives to innovate. At the tender stage, the contractor cannot invest too much in innovation work because of uncertainty whether he will win the contract or not. After a contract is awarded based on lowest price there are no strong incentives to innovate. The outcomes of investments in innovation work are uncertain and to reduce the risk of cost overruns the contractor is driven to use proven solutions with relatively certain consequences for time and cost performance.

Due to the drawbacks of lowest price selections, there has been growing interest in multi-criteria selections, also considering soft criteria ([Hatush and Skitmore, 1998](#); [Kumaraswamy and Anvuur, 2008](#)). It is especially vital that tender evaluation focuses on soft criteria in complex projects or when the contractor is expected to contribute to innovation in the design stage ([Bosch-Sijtsema and Postma, 2009](#)). Bid evaluations can include many different criteria, such as technical competence, management capability, earlier experience, reference objects, environmental and quality management systems, financial stability and collaborative skills ([Eriksson and Westerberg, 2011](#)). Accordingly, they can be design to address both exploration and exploitation.

Social interaction and partnering

A fourth governance aspect central for the possibilities and the motivation for exploration and exploitation is the collaboration and interaction among the partners, especially in integration strategies. Prior organizational research has shown that connectedness through social interaction enables both exploration and exploitation ([Jansen et al., 2006](#)) and is especially important when task interdependence is high ([Jansen et al., 2008](#)). This is because successful knowledge integration requires strong social ties, in terms of trust and shared values, between project partners ([Tiwana, 2008](#)). In addition, social interaction improves collaborative problem solving and resource allocation across explorative and exploitative activities ([Jansen et al., 2009](#)).

Prior organizational research has also pinpointed some collaborative aspects that are especially vital from an integration perspective. In their study, [Sidhu et al. \(2004\)](#) found that a strong shared vision enhances exploration. Other scholars argue that it is critical with a shared vision that highlights the objective of achieving both exploration and exploitation ([Jansen et al., 2008](#); [O'Reilly and Tushman, 2008; 2011](#); [Andriopoulos and Lewis, 2010](#)). In addition, a combination of both exploration and exploitation is enhanced when collaborating actors share joint physical work spaces ([Andriopoulos and Lewis, 2010](#)) or joint IT-systems ([Kristal et al., 2010](#)).

In the construction industry, collaborative relationships are often termed partnering. During recent years there has been an increasing interest in partnering arrangements, which are especially suitable in complex and uncertain projects ([Lu and Yan, 2007](#); [Eriksson, 2010](#)).

Because the client and the contractors have to interact to co-create the construction product, extensive use of collaborative activities and tools may be suitable to strengthen cooperation in partnering arrangements (Bayliss *et al.*, 2004; Eriksson, 2010).

Prior research presents many examples of vital activities and tools included in the collaboration model of partnering arrangements, such as formulation and monitoring of joint objectives, conflict resolution techniques, joint IT-systems and a joint project office (Bayliss *et al.*, 2004; Lu and Yan, 2007; Eriksson, 2008). These collaborative activities and tools cost both time and money to implement, but, in large and complex projects, they may have positive effects (Eriksson, 2015). Joint IT-systems facilitate integration and communication among project actors (Woksepp and Olofsson, 2008). Joint objectives enhance the development of a win-win situation in which all project participants together strive to achieve the jointly formulated objectives (Swan and Khalfan, 2007; Eriksson, 2015). Co-location in a joint project office on site enhances face-to-face communication and interaction, which is especially important in innovation work (Olsen *et al.*, 2005; Alderman and Ivory, 2007).

Method

By identifying gaps in and modifying prior work this study aims to extend and elaborate existing literature (Pratt, 2009) on procurement strategies for enhancing short-term efficiency and long-term innovation in construction projects. To empirically investigate the rationale of different procurement strategies for efficiency and innovation purposes and empirically ground the development of propositions about how procurement strategies enhance exploration and exploitation in different project contexts, a brief interview study was conducted.

Sampling: selecting respondents

A purposive sampling technique was adopted to identify respondents that can represent different types of actors with different activities and experiences in the Swedish construction industry. Both clients and contractors were targeted to capture a dyadic perspective on procurement strategies. The sampling also aimed to involve respondents active in both housing and civil engineering to get a broad construction industry perspective. At the client side, it was important to focus on public clients so that the suggestions regarding procurement strategies are consistent with the Public Procurement Act (PPA). At the contractor side, it was vital to involve both large national and international companies and more regional mid-sized companies to capture their experiences of different procurement strategies in both small and simple projects and large and complex projects. In addition, it was critical to target highly experienced respondents that had tried and tested many different procurement strategies over a long period of time.

The purposive sampling technique resulted in a sample of 11 respondents, including 3 civil engineering clients, 3 housing clients, 2 civil engineering contractors and 3 housing contractors; see Table AI in the appendix for details on respondents and their organizations. When the 11 respondents had been interviewed, theoretical saturation was perceived, that is, new data would probably not bring substantial additional insights to the research findings. Hence, it was decided that for the purposes of this study, additional interviews would bring little benefits and the initial sample of 11 respondents was therefore deemed sufficient.

Data collection and analysis

All 11 interviews were conducted face-to-face, mostly in the premises of the respondents' organizations. Contractors 3 and 4 were however interviewed in public places to reduce

travel time. The comprehensive semi-structured interview guide included questions about the respondent's organizations and their experiences of different procurement strategies, including all four major components of the procurement strategies identified and discussed in the literature review. The respondents were encouraged to elaborate on vital details in the four procurement components and the importance of different circumstances and conditions, by discussing the suitability of procurement strategies for different types of projects. Interviews lasted approximately 1 h, during which extensive notes were taken. Immediately after each interview the field notes were copy-edited and developed further by adding details and thicker empirical descriptions and clarifications, whereas the memory from the interview was still fresh. The extended copy-typed notes were sent to each respondent so that they could verify that the notes were indeed a valid representation of the interview discussion to further mitigate subject biases. Two respondents made minor changes to the notes, mostly in terms of additions and further clarifications.

The data analysis focused on looking for empirical patterns and similarities and differences related to the dimensions suggested by existing literature (i.e. the four procurement components) across empirical observations (Eisenhardt, 1989). Identified similarities and differences are illustrated by quotations from the interviews and discussed in terms of possible causes and explanations. The findings section is structured as a conceptually ordered display that empirically describes and extends each part of the theory (Miles and Huberman, 1994; Eisenhardt and Graebner, 2007), i.e. how the four procurement strategy components are perceived by the respondents. During data analysis further literature was reviewed and the empirical patterns were compared to prior research findings to investigate differences and similarities between the data and theory, that is, a pattern-matching analysis (Yin, 2003). Each sub-section in the discussion below ends with two propositions derived from the empirical and theoretical findings.

Findings and discussion: empirically and theoretically deduced propositions

Delivery system: timing and degree of involvement in design work

Design-build-contracts. During the interviews, it became clear that clients prefer using DB-contracts to enable contractor innovation and involvement. A main challenge is then to decide the level of control/constraints in the specification. From an asset management perspective, there may be some benefits of prescribing and constraining some technical solutions to get a more homogeneous stock of assets for the client to operate and maintain, but such constraints may also hinder both innovation and efficiency for the contractor during the project duration. Client 2 promotes DB-contracts but warn against constraints:

DB-contracts are useful when the client wants to bring in new ideas that can also be used in future projects. DB-contracts should be as little constrained as possible, the client must be open to new solutions. The prescribed and constrained details can affect other aspects that the contractor is responsible for, which can lead to problems.

Contractors are even more positive toward DB-contracts and pinpoint the drawbacks of constraints and prescriptions, as these reduce their possibilities for innovation and efficiency in the production stage:

We would like to see more DB-contracts where the contractor's expertise and experience are demanded. But tightly controlled and constrained DB-contracts that limit our ability to do a good job are negative (Contractor 2).

Prior literature emphasizes that due to the strong need for co-development in complex construction projects, knowledgeable clients need to get involved and contribute to joint

development work (Jacobsson and Roth, 2014). The respondents also highlight the importance of client involvement in DB-contracts, to make sure that the customized product is obtained: “DB-contracts require greater commitment from us as a client to get what we want, as this is not predefined in a detailed design” (Client 1). Also, the contractors argue that it is important that clients get involved in complex and customized projects, as highlighted by Contractor 2:

We would like the client to be more involved in the design stage in complex DB-projects. The contractor needs input in the design work because the client has a deeper knowledge of the business and its requirements.

Design-bid-build-contracts. In general, traditional DBB-contracts where the client specifies all technical solutions in detail are perceived less suitable, especially in terms of innovation (Korczyński, 1996; Rutten *et al.*, 2009; Eriksson and Westerberg, 2011), as emphasized by Contractor 3: *Many contractors turn off their creativity in DBB-contracts.* However, when uncertainty is high, which is rather common in civil engineering, this delivery system may be suitable, as pointed out by several respondents:

DBB-contracts are appropriate when there are uncertain ground conditions that the contractor cannot be expected to handle. It is important that risk is borne by the actor who can best manage and influence it (Client 2).

DBB-contracts are also considered appropriate when the production needs to be tailored to specific needs in the client’s existing operations:

DBB-contracts work best when the client has very specific needs in existing operations of which the contractor does not have so much knowledge and cannot influence. This is common in industrial and hospital projects (Contractor 3).

Timing of contractor involvement. The delivery system is not only about choosing type of contract but also about the timing and degree of contractor involvement. Because of the inter-organizational nature of construction work, innovation is developed and implemented in multi-actor settings, meaning that innovation involves coordination and negotiation among project actors (Winch, 1998; Bygballe and Ingemansson, 2014). Hence, early contractor involvement supports explorative development and innovation (Caldwell *et al.*, 2009) through joint problem solving and knowledge transfer between design and production. Client 5 highlights the relevance of timing:

We use DBB-contracts to control the design. But we involve contractors early, so that they can participate in the detailed design stage. Collaboration in the early stages enhances innovation by utilizing contractors’ knowledge.

Also, contractors pinpoint the importance of early involvement to lengthen their time for development work:

Contractors are always in a hurry. Often the planning stages are very long, but the construction stage is always pressed. Contractors can be more innovative if we get more time [through early involvement]. Otherwise there is never time to test and validate new solutions, so we do as we use to do, to keep up with the time schedule (Contractor 1).

Contractor 3 emphasizes that early involvement in joint design work is a central part of partnering:

We believe that partnering requires a joint specification stage where actors either perform design together or at least go through the design together to find better or cheaper solutions or to remove

some parts to reach a previously established budget. Thanks to such joint specification, we avoid change order discussions later in the project.

Summary and propositions. Both literature and respondents agree that contractors need to be involved early and that clients and contractors should collaborate in development work. This can be obtained through DB-contracts if the client is engaged in the contractor's development work or through DBB-contracts if the contractor is procured early and involved in the client's development work. Such joint specification enhances both exploration and exploitation in large and complex projects. In small and simple projects, the need for co-development is lower for which reason traditional DB or DBB-contracts can be utilized to enhance exploitation. These reflections based on the literature review and the empirical findings have resulted in the following propositions:

- P1a.* Joint specification based on early involvement of contractors in DBB-contracts or client involvement in DB-contracts, enhances both exploration and exploitation in large complex construction projects.
- P1b.* Delivery systems based on traditional DB or DBB-contracts enhance exploitation in small and simple construction projects.

Reward system

Fixed price payment. In line with [Bajari and Tadelis \(2001\)](#) both clients and contractors argue that fixed price contracts only are suitable in simple projects where uncertainty is low: *Fixed price is good when everything is simple and either predetermined (DBB-contract) or have distinct and clear functional requirements (DB-contracts). It is less suitable in complex and risky projects* (Contractor 2). In uncertain situations, fixed price will be problematic due to a high amount of change orders. Client 2 emphasizes that clients need to be prepared for change orders initiated by the contractor in fixed price contracts:

In fixed price contracts it belongs to the rules of the game that the contractor will try to find change orders. The client must produce good documents in detailed design, which requires experience.

Cost reimbursement and incentives. Because many projects currently are large and complex undertakings that face high uncertainty, cost reimbursement is perceived more suitable than fixed price, but, to motivate contractors to be efficient and innovative, the respondents claim that it is vital to also use incentives, bonuses, or fixed contractor fees. *We use cost reimbursement rewards coupled with incentives or a fixed contractor fee at our partnering projects* (Client 1). Contractors 1 and 5 highlight the importance of incentives in cost reimbursement contracts, otherwise they may work less hard:

Cost reimbursement is good when there is high uncertainty, but it should be linked to incentives. When cost reimbursement is used, the contractor is not on his toes all the time, we need motivation (Contractor 1).

Pure cost reimbursement is not so good; there is nothing to win for the contractor. Hence, it is important to link it to incentives. The contractor must be paid for good ideas. If the contractor is not allowed to make money from improvements you stop to suggest improvements after a while (Contractor 5).

A problematic aspect of incentive-based payment is the discussions of target cost adjustments that may emerge when project changes are implemented ([Kadefors, 2004](#);

Badenfelt, 2008; Boukendour and Hughes, 2014). Client 5 highlights this problematic aspect and the risk of the contractor becoming focused on raising the target cost instead of lowering the actual costs:

A disadvantage of incentives is that they can result in discussions around target cost. The contractor has an interest to set the target as high as possible and then prove successful and be happy that we succeeded in reaching lower costs than the target, because then we will share the profits.

Fixed fee. Because discussions about target costs often are perceived dysfunctional some clients favor fixed fee arrangements instead of incentives:

We work primarily with cost reimbursement and a fixed contractor fee. The contractor thus knows how much he will profit from the project. By working efficiently and reducing costs the relative profit (i.e. the profit margin) will be increased. Some contractors would rather have an incentive-based payment, but I think a fixed fee is better (Client 5).

As Client 5 indicates, there are mixed feelings about this among contractors. Contractor 1 clearly favors incentives before fixed fee and argues that target cost discussions are not all bad:

Incentives are better than fixed contractor fee to create motivation. Target cost incentives are not difficult if the client and the contractor are competent. One should not abolish this option because it is difficult, one should instead learn how to implement it. Incentives create motivation for learning and development, and target cost discussions can create vitality and competitiveness in the relationship.

Other contractors, however, prefer fixed fees, as this provide sufficient motivation for cost reduction: the more the contractor can reduce costs, the higher will be the relative profit. Contractor 3 argues that “*the best conditions for efficient collaboration and innovation can be obtained by avoiding complicated incentive structures and bonus systems that usually bring out the parties’ own interests*”. Contractor 2 also favors fixed fee but point out that it should be complemented with other types of bonuses:

Cost reimbursement with fixed contractor fee should be preferred in more cases than what is currently being implemented. But it needs to be used together with bonus opportunities connected to criteria important for the client, such as customer satisfaction and timeliness.

Summary and propositions. Fixed price is most suitable in rather small and simple projects with low uncertainty. To enhance both efficiency and innovation in large and complex projects cost reimbursement coupled with incentives/fixed fee and bonus opportunities is more suitable. Incentives work best for moderate uncertainty, when not too many changes can be anticipated, and the target cost will not change too much. When uncertainty is high, a fixed fee may be better than incentives. Both incentives and fixed fee should be complemented with bonuses tied to non-economic aspects to strengthen the actors’ focus on quality, environmental aspects and collaboration. The theoretical and empirical findings have inspired two propositions:

P2a. Reward systems based on cost reimbursement coupled with incentives (at moderately high levels of uncertainty) or fixed contractor fee (when uncertainty is high) and bonus opportunities connected to non-economic criteria enhance both exploration and exploitation in large complex construction projects.

P2b. Fixed price payment enhances exploitation in small and simple construction projects.

Partner selection

Pre-qualification. Some clients prefer a two-stage partner selection process where suitable partners first are pre-qualified before their bids are evaluated. According to Clients 3 and 4, this can be especially important in complex DB-contracts for which it is challenging and costly to prepare tenders: “When procuring DB-contracts, a prequalification stage is suitable to reduce the number of bids. This leads to a better tendering process and removes some inappropriate suppliers” (Client 3). “We prefer prequalification to improve quality and reduce the number of unnecessary, non-successful bids. We care about the contractors and do not want them to work with tenders unnecessarily” (Client 4).

Lowest price selections. Many clients and contractors argue that a strong focus on lowest price is a poor basis for selecting a suitable partner: “Focus on lowest price is unsuitable in construction procurement; it can lead to higher lifecycle costs” (Client 1). “Procuring construction projects based on lowest price is the single biggest obstacle to innovation and creativity” (Contractor 3). Some contractors, however, believe that focus on lowest price promotes a fair and objective evaluation, at least in simple projects with low uncertainty, as illustrated by Contractor 1:

Lowest price works best. After a pre-qualification it should be the lowest price that determines who gets the job. Soft criteria are based on subjective assessments, which become arbitrary. However, in complex partnering projects soft criteria are good, the client then does not know what he is going to build and wants to buy an organization, not an object.

However, Contractor 2 argue that they may avoid complex projects with lowest price selections:

Lowest price is appropriate when the client knows exactly what he wants and everything is already designed. It may also be appropriate for DB-contracts when the functional performance requirements are clear and the project is not too large and complex. Otherwise, also soft criteria should be evaluated. When there is too much focus on lowest price in complex projects, we can refrain from bidding, because other contractors may then try to win the contract with very low prices and then seek change orders.

Multiple criteria. Tender evaluation based on multiple criteria is especially relevant in complex projects or when the contractor is expected to contribute to innovation in the design stage (Bosch-Sijtsema and Postma, 2009). Many respondents stress the importance of evaluating multiple criteria, such as organization, collaboration model, reference objects and interviews with key people. Clients 1 and 3 pinpoint that it is especially vital to select a capable partner in complex projects and to promote a long-term perspective through the bid evaluation: “Complex and technologically advanced projects require a focus on soft criteria to ensure that the selected supplier has the ability required” (Client 3):

Soft criteria are important for property managers with a long-term perspective. We can make demands in tender documents and evaluate contractors’ ability to manage innovation as a soft criterion, forcing bidders to think hard before the project. We usually have about 25 per cent on price and 75 per cent on soft criteria (Client 1).

Some soft *criteria* (e.g. environmental impact and life-cycle costs) are considered important but difficult to evaluate. The difficulties of formulating and evaluating these criteria have hindered the implementation of them, but Client 3 believes that this challenge will be dealt with: “Life cycle costs and environmental concerns (including energy consumption) has had a low priority for us, but it will definitely increase in the near future” (Client 3). Other respondents highlight that evaluating soft criteria involves more subjective assessment than evaluating lowest price, which increases the risk of appeals against the selection of a

winning contractor. Hence, it is important for public clients to evaluate bids as transparently and objectively as possible according to PPA. Contractor 5 claims that the difficulty of evaluating soft *criteria* makes some clients hesitating to use them: “*Public clients have become afraid of appeals and often avoid soft criteria. But in partnering projects soft criteria are more common*”. Client 6 admits this hesitation about using soft criteria, but perceives it to be very negative: “*The trend towards a focus on lowest price stems from a fear of appeals when evaluating soft criteria, which is a shame*”

Summary and propositions. Choosing bid evaluation *criteria* often involve a mix of multiple criteria. In general, lowest price focus is more suitable in small and simple projects with low uncertainty, where the bid price also can be equal to the final costs. A focus on lowest price is however inappropriate in large and complex projects where the demand for innovation and adaptability require selection of contractors with strong capabilities and suitable experiences. These reflections based on both theoretical and empirical findings have resulted in two propositions:

- P3a.* Bid evaluation including multiple criteria based on a mix of lowest price and soft criteria enhances both exploration and exploitation in large complex construction projects. The more challenging the project characteristics, the more focus on soft criteria is suitable.
- P3b.* Focus on lowest price in bid evaluation enhances exploitation in small and simple construction projects.

Collaboration models in partnering arrangements

Partnering arrangements. Both clients and contractors are positive toward the use of partnering, and, in line with prior research (Eriksson, 2010), the respondents perceive it especially suitable in large complex projects with high uncertainty. Clients 1 and 5 use partnering extensively in their construction projects, especially when uncertainty is high:

We use partnering in about 75 per cent of our projects and we think it is quite superior. The contract will then act as a safety net but we have a shared responsibility and a mutual task to solve together. Partnering is especially good when the client is not quite sure what the final product will be” (Client 1).

More than 50 per cent of our volume concerns partnering projects, which are particularly suitable for refurbishment. We have uncertainties concerning the existing building and we must make sure to not interfere with ongoing activities, which require collaboration. In addition, we have many changes during the project which requires flexibility and collaboration (Client 5).

Also, the contractors are custom to partnering and have positive experiences of this way of working together. However, Contractor 5 further emphasizes the important notion than partnering is not suitable for all projects: “*Partnering is appropriate when there is lack of time, and high complexity and uncertainty. But if the client knows exactly what he wants partnering is unnecessary*”.

Collaboration models. However, partnering is not easy to implement; it is important to implement it in appropriate ways and for the right reasons. Hence, it is important to utilize a wide range of collaborative tools and activities to create a collaborative climate (Bayliss *et al.*, 2004; Lu and Yan, 2007). Contractor 3, who only performs partnering projects, especially highlight the importance of co-location when implementing partnering:

We always establish a joint project office where even the architect/consultant sits at least one day a week together with the client and contractors. Initially, consultants are often opposed to this, but as the project progresses they become satisfied when discovering the advantages of effective communication and decision making.

Furthermore, specific partnering workshops are important parts of the collaboration model (Eriksson, 2015), as these can serve as forums where project actors openly and honestly discuss their collaboration. Contractor 1 emphasizes the importance of a creative and open climate where different opinions are allowed and discussed:

Partnering is like a marriage, you have to give and take, everything is not always perfect; disagreements must be allowed to emerge and dealt with constructively. We cannot just be scratching each other's' backs all the time. Many clients are afraid of conflict, they want us to be good friends all the time, no disagreements may occur.

Summary and propositions. Collaborative activities and tools in partnering relationships are considered important in large and complex projects with high uncertainty because such projects require a great degree of co-development in design and production processes. To enhance collaborative co-development among the key-actors, collaborative activities and tools can be implemented, supporting communication, interaction and knowledge sharing. However, in small and simple projects, partnering will bring little benefits and may therefore be unnecessary. The following propositions are based on the theoretical and empirical findings:

- P4a.* Partnering based on a broad range of collaborative tools and activities enhances both exploration and exploitation in large complex construction projects. The more challenging the project characteristics, the more collaborative tools and activities should be used.
- P4b.* Partnering is not necessary to enhance exploitation in small and simple construction projects.

Conclusions

The study presented in this paper has investigated how different procurement strategies affect the actors' possibilities and incentives for exploration and exploitation in construction projects. Combining exploration and exploitation is critical for obtaining both short-term efficiency and long-term innovation and thereby sustainable performance (March, 1991). This paper contributes to organizational learning literature by an explicit focus on the operational project-level, which has been somewhat neglected in previous studies. Prior firm-level studies indicate that strategies separating exploration and exploitation in space and/or time are suitable to enable sustainable performance (Tushman and O'Reilly, 1996; O'Reilly and Tushman, 2008). However, at the project level, separating strategies that isolate exploration and exploitation activities in time or in different sub-units are not effective due to the strong interdependencies among different project actors and their activities. Instead, combining exploration and exploitation through integration is more effective. Challenging project characteristics increase the need for co-development in complex construction projects. Hence, key actors need to interact in explorative and exploitative activities to enhance knowledge sharing and joint problem solving.

Procurement strategies are critical to create both possibilities and incentives for combining exploration and exploitation. The main contribution to the construction management literature involves the investigation of how procurement strategies may affect

exploration and exploitation, as identified and articulated in the propositions developed in this paper. The findings propose that small and simple projects with low uncertainty and scarce resources may focus on exploitation to enhance short-term efficiency. Such projects can be governed through traditional procurement strategies including delivery systems that separate the actors and their activities (i.e. pure DBB- or DB-contracts), fixed price payment and focus on lowest price in bid evaluation. Partnering arrangements are not necessary to enhance exploitation in such projects. On the other hand, large and complex projects with high uncertainty and customization require more collaborative procurement strategies (Eriksson, 2008). To enhance a combination of exploration and exploitation in such projects, procurement strategies are proposed to include joint specification through early contractor involvement, cost reimbursement coupled with incentive-based payment or a fixed fee, bid evaluation based on multiple criteria and a wide range of collaborative tools and activities in partnering arrangements.

The findings of this paper can serve as a starting point for discussing and investigating the role of procurement strategies for explorative and exploitative learning, which are critical for successful project management and asset management. The main limitation of the study is the limited empirical investigation based on a small number of interviews. In future research, it would be relevant to test these propositions through large scale quantitative survey studies or a multiple case study investigating how the two main procurement strategies affect exploration and exploitation in different project settings.

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Type of actor	Description
Client 1 Mid-sized regional housing client	Client 1 has been 12 years at a municipal housing company in a mid-sized Swedish city. He is now Head of Purchasing, responsible for construction purchasing and contracting. Previously, he also has 28 years of experience as a contractor in residence building
Client 2 Large regional civil engineering client	Client 2 is employed in his own consultancy company since 1993 but currently engaged as a procurement manager for the client of a mega infrastructure project in Stockholm. Previously, he has also worked for two large contractor companies
Client 3 Large national civil engineering client	Client 3 was at the time of the interview Head of a Project Department at the Swedish Transport administration (STA). He has previous experience at the contractor side as CEO of two large electrical and mechanical contractor companies
Client 4 Mid-sized national housing client	Client 4 is Head of property development at a Swedish association of municipal housing companies. He is working with development issues at the national level, together with the municipal housing companies within the association. Previously, he has worked 11 years at three different large housing contractors
Client 5 Mid-sized regional housing client	Client 5 has been head of projects at County Council Services in a region north of Stockholm for the past 12 years. The construction work mainly involves hospital refurbishments but also construction of new hospitals. Previously, he has worked as a contractor for 35 years
Client 6 Large national civil engineering client	Client 6 has been procurement manager for major projects at STA for many years. He has also a lot of procurement experience from other industries, such as corporate head of procurement at a bus company and purchasing manager in the aerospace industry
Contractor 1 Large national civil engineering contractor	Contractor 1 is the Regional Manager for civil engineering in Stockholm, in a large Swedish contractor company. He started working in the construction sector in 1978 and has worked for a couple of other contractor companies, before he started working for this contractor company in 1993
Contractor 2 Large national housing contractor	Contractor 2 is the Regional Manager of housing in northern Stockholm, in a large Swedish contractor company. His unit primarily works with schools, offices, and laboratory facilities, both for public and private clients. He has worked for this contractor company since 1987, as purchaser, design manager, project manager and district manager
Contractor 3 Mid-sized regional housing contractor	Contractor 3 is co-founder and CEO of a mid-sized contractor company, which started in 2007 and is exclusively focused on partnering projects. Operations are focused on housing and industrial projects in the western and central parts of Sweden. Previously, he has worked 30 years for a large Swedish contractor company
Contractor 4 Large international civil engineering contractor	Contractor 4 is project manager for major construction projects in a large German contractor company that operates globally. Previously, he was project manager for major construction projects of a large Swedish contractor company, mostly focusing on mega infrastructure projects
Contractor 5 Mid-sized regional housing contractor	Contractor 5 is CEO of a mid-sized contractor company. He began working for this company in 1989 and became CEO in 1998. The company focuses on housing projects in the northern of Sweden, but they also have a subsidiary that develops and manages properties

Table AI.
Respondents and
their organizations

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