

# Clients as drivers of innovation in the infrastructure sector: implications of hard and soft project management approaches

Hard and soft  
project  
management  
approaches

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## Abstract

**Purpose** – By adopting the “hard” and “soft” project management (PM) approaches from the PM-literature, this paper aims to problematize the expected role of client organizations in driving innovation in the transport infrastructure sector.

**Design/methodology/approach** – Addressing a large public client in Sweden, a case study design was initially applied to provide in-depth insights and perspectives of client project managers’ views and experiences of managing projects expected to drive innovation. In this paper, the concepts of “hard” and “soft” are used to discuss empirical findings on challenges associated with adopting a PM-approach for driving innovation in projects. The empirical material consists of interview data, complemented with observations and archival data.

**Findings** – Findings reveal challenges associated with combining hard and soft approaches, frequently demonstrating difficulties in balancing short-term project expectations with the promotion of innovation. In line with the literature, project managers note that there is a need for soft approaches to promote development and drive innovation. Yet, findings reflect a situation in which operational success criteria predominate, whereas soft approaches are not sufficiently used to create the grounds required for fostering innovation.

**Originality/value** – Insights are provided into how PM-approaches may impact construction innovation in the infrastructure sector, demonstrating a need for further research on the challenges and implications of applying and combining hard and soft PM-approaches.

**Keywords** Client, Construction innovation, Project management, Public transport infrastructure, Soft project management, Hard project management

**Paper type** Research paper

## 1. Introduction

The significance of client organizations in driving change and innovation in the construction sector has frequently been stressed by researchers (Aouad *et al.*, 2010; Loosemore and Richard, 2015; Rose *et al.*, 2019). The research presented in this paper acknowledges that project management (PM) is a central discipline in the construction sector and addresses PM as pivotal in the project-based client organization’s ability to drive innovation. Thus, the

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research builds on findings by e.g. Ivory (2005) in proposing that the PM-approach of professional construction clients may negatively affect their ability to be innovative and adopt innovation in projects.

Until quite recently, PM-research rarely focused on the theory of PM-practices (Winter *et al.*, 2006). In the PM-literature, professional bodies have contributed (e.g. PMBOK guide) to the coherent field of knowledge that is generally considered as the best practices. Typically, this view of PM is presented during basic courses at universities (Winter *et al.*, 2006). This body of knowledge includes the shared fundamental assumption that better planning, risk identification and control will lead to the better execution of projects. However, research has come to recognize that PM, when considered from this well-established approach, fails to support innovation (Shenhar and Dvir, 2007); hence, recent research has called for more flexibility and organic forms of project organization. The general line of reasoning is that projects which face high degrees of complexity and uncertainty, such as those involving innovation, require PM-approaches associated with an ability to adapt, change and learn as the project progresses (Lenfle and Loch, 2010).

PM in the construction sector is rooted in the traditional (i.e. “hard”) PM-paradigm that favors plannability, risk reduction and control (Eriksson *et al.*, 2018; Giezen, 2012; Koppenjan *et al.*, 2011; Zender and de Soto, 2020). Infrastructure projects are often public ventures with high public scrutiny; according to Eriksson *et al.* (2018), this requires the creation of control structures. The hard approach to PM in construction has also previously been linked to project performance (Giezen, 2012; Larsson *et al.*, 2018). At the same time, Eriksson *et al.* (2018) note that there is a need for more flexible or “softer” PM-approaches which would involve increased collaboration to facilitate change. This is not a new perspective for the construction sector. In fact, various studies have highlighted that clients need to increase flexibility in their projects to cultivate, harness and innovation (Kulatunga *et al.*, 2011; Sergeeva, 2019; Zender and de Soto, 2020). This perspective suggests that project practitioners need to combine both hard and soft approaches when managing projects (Karrbom Gustavsson and Hallin, 2014; Winter *et al.*, 2006), including transport infrastructure projects (Eriksson *et al.*, 2018; Koppenjan *et al.*, 2011). Yet, regardless of such propositions and the central role of PM in construction, there has been little empirical research into construction innovation from a project perspective (Xue *et al.*, 2014), and the PM-approaches applied by construction clients continue to receive limited research interest (Winch and Leiringer, 2016). In fact, within the field of construction management, which is largely project-based, scant research has aimed to provide insight into which PM-approaches enable and support innovation.

In this paper, we present findings from a study addressing Sweden’s largest client in the transport infrastructure market, i.e. the Swedish transport administration (STA). In response to the argument above, we adopt the “hard” and “soft” approaches from the PM-literature as concepts to problematize the expected role of client organizations such as the STA in driving innovation in the construction sector. More specifically, the research presented in this paper had a twofolded aim. First, we assessed STA project managers’ views of how to purposefully and successfully manage STA transport infrastructure projects that were specifically expected to drive and support innovation (see 4. Findings). Second, we discuss which challenges emerge when PM-practice attempts to combine both hard and soft approaches, as well as how these challenges impact the ability of the client organization to drive innovation in transport infrastructure projects (see 5. Discussion).

## 2. Theoretical background

As a field of practice, PM has a practitioner-driven theoretical base that originates from highly innovative, complex and uncertain undertakings in the aerospace, defense and

construction industries. From the 1940s onwards, PM began to increasingly focus on tools and techniques for planning and control (c.f. [Cicmil and Hodgson, 2006](#); [Lenfle and Loch, 2010](#)). The popularization of PM in business life and society, the so-called “projectification” ([Packendorff and Lindgren, 2014](#)), has resulted in the professionalization of the field, including the emergence of the project manager role and the establishment of best practice methods. The PM discipline struggles to agree on certain universal principles and norms, as demonstrated by the existence of numerous national associations, each of which generally has its own knowledge base ([Cicmil and Hodgson, 2006](#)). Nevertheless, the dominant PM-discipline adopts an instrumental view with strong normative elements (see e.g. [Cicmil and Hodgson, 2006](#); [Engwall, 2003](#)).

As discussed by [Lenfle and Loch \(2010\)](#), it seems that although PM originated from highly innovative projects, subsequent developments have emphasized planning and control over exploration and iterative work. There is an ongoing discussion among researchers on the implications and limitations of this dominant PM-view (see e.g. [Charles \*et al.\*, 2022](#); [Cicmil and Hodgson, 2006](#); [Lalic \*et al.\*, 2022](#); [Lenfle and Loch, 2010](#); [Packendorff and Lindgren, 2014](#)). For example, this approach to PM has been criticized for poor applicability to innovative contexts ([Keegan and Turner, 2002](#); [Lenfle and Loch, 2010](#); [Toole \*et al.\*, 2013](#)), i.e. traditional methods for evaluating project performance, which adhere to predefined criteria or the “iron triangle,” stifle innovation ([Keegan and Turner, 2002](#)). Research from the construction management context has even suggested that projects that are successful from a client perspective, i.e. on time and within budget, may hamper long-term innovation in the construction sector ([Ivory, 2005](#)). Furthermore, in their literature review of success factors in construction PM in post 2004 research, [Charles \*et al.\* \(2022\)](#) noted that technological innovations have contributed to a shift in how the industry views PM-practices. More recently, client involvement and using soft skills have been introduced as important approaches for successful project outcomes (*ibid*).

Since the early 2000s, a stream of research has studied project typologies and contingencies ([Shenhar and Dvir, 2007](#)). Researchers have suggested that PM would benefit from more eclectic theories that reflect the uniqueness of individual, real-life projects and could match PM-approaches according to the specific demands of projects ([Lalic \*et al.\*, 2022](#)). Various dichotomous concepts have been proposed and used within the field as a means to understand the differences between projects ([Crawford and Pollack, 2004](#)), approaches ([Koppenjan \*et al.\*, 2011](#)) and views ([Shenhar and Dvir, 2007](#)). In line with the discussion above, the general line of argument is that higher complexity and uncertainty warrant more flexible management approaches that can deal with changes and adaptations ([Eriksson \*et al.\*, 2018](#); [Koppenjan \*et al.\*, 2011](#)). Two contrasting concepts commonly used in both practice and research are “hard” and “soft” PM (see e.g. [Crawford and Pollack, 2004](#); [Karrbom Gustavsson and Hallin, 2014](#)), with the latter generally considered a response to failures identified in the former.

Researchers generally agree that hard PM approaches reign supreme in the construction sector ([Larsson \*et al.\*, 2018](#); [Zender and de Soto, 2020](#)). A key assumption of hard PM is that projects are initiated with clear project goals ([Lenfle and Loch, 2010](#)). For example, because the primary concern of PM is execution, PM is considered to be an operational tool. Thus, the strategic dimension is left outside the realm of PM. The hard approach also assumes that situations are characterized by certainty, predictability and routines. In such situations, project managers can plan their activities and rely on routine execution ([Eisenhardt and Tabrizi, 1995](#)). However, this assumption fails to acknowledge the inherent uncertainties involved in projects, along with the potential

ambiguity of project success (Cicmil and Hodgson, 2006). When uncertainty prevails, project managers need flexibility, explorative learning and creativity to adapt to changes (Eisenhardt and Tabrizi, 1995). These situations require soft PM approaches to deal with uncertainty, unpredictability and innovation. A similar type of reasoning is prevalent in the construction management literature, i.e. flexible project governance by clients is considered necessary for fostering innovation (Sergeeva, 2019). It has also been proposed that client organizations need greater flexibility in their technical specifications to enable innovation (Fernando *et al.*, 2019) as well as an open-minded approach to choosing which solutions to prescribe (Loosemore and Richard, 2015).

In summary, research in the project- and construction management literature has acknowledged different PM-approaches and suggested the need to adapt the PM-approach based on the project context. From previous research distinguishing archetypes in PM (Shenhar and Dvir, 2007; Lenfle and Loch, 2010; Crawford and Pollack, 2004; Davies and Brady, 2016; Koppenjan *et al.*, 2011) a hard and soft approaches framework is introduced in Table 1, highlighting key aspects of PM for each of the two constructs. Though it has been stressed that PM-approaches should be understood as a continuum (Crawford and Pollack, 2004; Karrbom Gustavsson and Hallin, 2014), it has also been noted that analyzing PM-approaches according to hard and soft dimensions can provide a basis for questioning assumptions about the nature of a project (Atkinson *et al.*, 2006). For the research presented in this paper, the PM-literature on hard and soft approaches is introduced to critically address possible implications of a dominant (typically hard; see Larsson *et al.*, 2018; Zender and de Soto, 2020) PM-approach for driving and managing innovation in construction projects. From this view, the dichotomous hard/soft framework in Table 1 is used as a tool to assess and discuss concrete meanings for the PM-practice of combining conflicting PM-approaches (Karrbom Gustavsson and Hallin, 2014; Winter *et al.*, 2006) to deal with the reality of infrastructure projects (Koppenjan *et al.*, 2011; Eriksson *et al.*, 2018).

### 3. Method

In line with our methodological position, we acknowledge the importance of meanings and perspectives to understand social phenomena. The research is designed to provide insights and perspectives of client project managers' (subjective) experiences and views on how to drive and support innovation in construction projects and associated challenges. A case study design was applied to allow for an in-depth context-specific examination (Yin, 2013). The case study addressed the managing of projects to facilitate innovation in STA infrastructure projects, and the data for the research were collected in 2017 (Mar–Oct). The research process followed an iterative process of going back and forth between the framework, data sources and analysis, like the abductive case study approach proposed by Dubois and Gadde (2002).

Data collection for the case study took place within the STA Department of Investment responsible for executing projects from planning to the production of transport infrastructure. The empirical material includes recorded and transcribed interviews with 14 STA project managers, complemented with observational and archival data. Observational and archival data were collected by one of the researchers during a two-week stay at a STA project office (March 2017) to support the understanding of work practices, formal structures and directives described and referred to in interviews. Observation data included first-hand observations of day-to-day activities, informal chats with and between STA project managers and technical support staff. Archival data included project process

Aspect	Hard project management approach	Soft project management approach
<i>Key paradigm</i>	A project is a process of activities and tasks that needs to be completed <sup>a</sup>	A project is a strategic activity which contributes to a larger business objective <sup>a</sup>
<i>Project manager role</i>	Delivering the project on time and within budget, as well as adhering to defined specifications <sup>a</sup>	Delivering the project from a more holistic perspective, to create business results and value <sup>a</sup>
<i>Success criteria</i>	Linked to operational/project success <sup>a</sup>	Linked to strategic/organizational success, i.e. how outcomes of a project will influence the organization <sup>a</sup>
	Typically understood in terms of the “iron triangle,” i.e. project completion on time and within budget, performance <sup>a</sup> and associated with quantitative criteria <sup>c</sup>	Typically understood in terms of business success, impact on customer, impact on business, long-term results, value <sup>a</sup> and associated with qualitative criteria <sup>c</sup>
<i>Targets</i>	Targets are provided, by e.g. top management or client <sup>b,d</sup> , are (preferably) clearly stated and typically predefined with a given set of resource constraints <sup>c,d</sup>	Targets evolve, from a general vision and direction rather than from clear and specific objectives at project outset <sup>b</sup> , i.e. objectives are ambiguous and difficult to define at initiation <sup>c,d</sup>
<i>Activities</i>	Targets are associated with a tangible physical artefact <sup>c</sup> Activities can be articulated, defined and planned <sup>b</sup> , associated with narrow and clear task definition <sup>e</sup> Associated with the refinement of one solution <sup>c</sup>	Targets are associated with abstract concept <sup>c</sup> Activities are partly emergent <sup>b</sup> , associated with broad task definition <sup>e</sup>
<i>Stakeholder involvement</i>	Associated with expert practitioner, coordinating approach with limited or no stakeholder participation <sup>c</sup>	Associated with a participative, collaborative and facilitative approach with high stakeholder involvement <sup>c</sup>
<i>Project changes</i>	Changes are undesirable and should be limited <sup>e</sup> Changes are associated with variation (plan deviations) and risks (stochastic, estimable changes in known project variables) <sup>b</sup>	Changes are viewed as inevitable and should be facilitated <sup>e</sup> Changes are associated with unforeseeable uncertainty, i.e. new variables, effects and actions, which could not be anticipated at the outset <sup>b</sup>

**Sources:** Shenhar and Dvir, 2007<sup>a</sup>; Lenfle and Loch, 2010<sup>b</sup>; Crawford and Pollack, 2004<sup>c</sup>; Davies and Brady, 2016<sup>d</sup>; Koppenjan *et al.*, 2011<sup>e</sup>; Developed by author by adapting and compiling research proposing categories of project management approaches, acknowledging in particular the work by Shenhar and Dvir (2007), Lenfle and Loch (2010), Crawford and Pollack (2004), Davies and Brady (2016) and Koppenjan *et al.* (2011)

**Table 1.** Contrasting project management approaches

steering documents, handbooks and internal guidelines for investment projects and PM, all extracted from the STA intranet.

The interviews each lasted between 1 and 2 h and were structured around the following topics:

- how the project managers perceived their role in construction innovation;
- how they – as project managers – thought they could act, and had acted, to promote development and innovation; and
- what they perceived as drivers and hurdles for the promotion of innovation.

The interviewees were all purposefully selected project managers who, alongside other STA-projects, had been involved in at least one “development-promoting” (DP) project. DP

projects were internally categorized projects that had taken project-specific actions to promote innovation following an internal guideline of suggested innovation-promoting actions. In this context, and in line with STA's formal definition of innovation in the internal guidelines for DP-projects, innovation is understood as the implementation of a nontrivial change and improvement (Slaughter, 1998) in STA-projects. Thus, the STA's DP-projects in 2017 represent investment projects that include the objective of developing some new transport infrastructure and, in the process, promoting innovation. See Endnote [1] for additional information on the formal process of managing investment projects at STA and the rationale for DP-projects.

Following multiple readings of the transcribed interviews and an initial coding (process described by Miles and Huberman, 1994, p. 58), several expected and encountered "challenges" of managing DP-projects purposefully and successfully seemed to emerge. The challenges did not seem to connect as much to distinct, single actions as to perceived conflicts between, on the one hand, actions and behaviors associated by project managers with supporting innovation and, on the other hand, the established (and relatively similarly described by the interviewees) way of work, following the formal process of managing projects. To better understand the challenges and their impact on the STA ability to act in response to the government directive (SFS, 2010, p. 185) and increase innovation in the construction market, the hard and soft PM-approaches were applied as analytical framework. Although the research followed an iterative process, the assessment and discussion of findings could be illustrated by the following four steps:

- (1) Step 1: Interview data, including results from the initial coding, were readdressed and recategorized by the two authors independently as:
  - Expressions alluding to how DP-projects should be managed to drive and support innovation;
  - Expressions alluding to how DP-projects were actually managed;
  - Expressions alluding to perceived difficulties associated with (a); and
  - Expressions alluding to discrepancies between (a) and (b), including perceived reasons.
- (2) Step 2: The results from Step 1, containing quotes relating to (a)–(d), were compared and compiled. In this process, observational and archival data were consulted to support the interpretation and understanding of interview-findings.
- (3) Step 3: The two authors then used Table 1 as the analytical tool for independent assessments of the soft and hard PM-approaches in DP-projects. The results were cross-analyzed for concordance/disagreement. In particular, the results from Step 3 revealed attempts by project managers to combine both hard and soft approaches and subsequent challenges. The results from Step 3 are presented in the next section.
- (4) Step 4: Finally, the identified challenges of combining PM-approaches were put in relation to the literature to further discuss the potential impacts on the ability of the client organization to drive innovation in DP-projects.

#### 4. Findings

This section corresponds to the first part of the aim (analysis Step 3 in the method section). The findings will present views and understanding of how DP-projects should be, and are

managed, to reveal attempts by project managers to combine both hard and soft approaches and subsequent challenges.

#### *4.1 Assessment of the soft project management approaches used in Swedish transport administration projects*

The interviewees collectively agreed that innovation is necessary for organizational development and to avoid stagnation in the construction industry. The interviewees responses suggested that project managers view the project manager role as important for innovation to take place in projects. Several of the interviewees stated that the project manager role includes the responsibility of considering possibilities for change and improvement. When considering their position as project managers at the largest transport infrastructure client in Sweden, the interviewees recognized that they are able to promote innovation and development among project suppliers in the transport infrastructure market. Regarding long-term development, the project managers talked about the importance of project-related actions, including e.g. trying new forms of project procurement and allowing for the testing of new solutions. In this context, the project managers stressed that these actions may well-challenge project boundaries, as well as call for established rules and norms to be contested.

We need to be at the forefront of new ideas, although I don't think we do it enough. Being a large client, we need to make use of new ways of procuring and new ways of solving problems – Project manager M

Thus, while project managers agreed that their management involve both the responsibility and mandate to enable innovation to create business results and value, they are also aware that exercising this mandate is associated with some significant challenges. Several of the project managers elaborated on their responsibility and mandate to promote innovation in projects by highlighting “autonomy” as a key feature of their professional role. For example, project managers stated that it is well within the role of a project manager to balance project resources and make subsequent decisions regarding changes in the project plan, including measures needed to contest any previous agreements (typically the contract with the supplier). One project manager illustrated this as follows:

The contractor came up with a relatively big change [...] initially they contacted our consultant but the consultant thought it was too big of a change, so they didn't dare to approve the new solution – it seemed like a big change to the contract. So then we had a meeting during which the contractor presented their new solution and we ended up accepting this new solution [...] they will profit from it and we will save some money on it – Project manager G

The autonomy of a project manager may be significant in enabling project managers to act in ways that support innovation; however, this autonomy can also have the opposite effect, i.e. suppress innovation in projects.

Under soft PM, success criteria include long-term results and value. The project managers described this as the need for a more holistic perspective than what is customary, i.e. stretching beyond the boundary of a single project. Project managers inferred that innovation which confers a relatively small improvement in one project may still have a significant impact if transferred to other projects. Although such innovation will likely be regarded as “not worth the risk and effort” from a project view, it could gain support when assessed from a long-term business perspective.

We test new solutions in too big projects [...] however, it would make more sense to test these solutions in smaller projects where failure will not cause too much damage and we can learn [...] however, such possibilities seem limited today – Project manager J

Furthermore, the project managers elaborated that including incentives in contracts can support innovation. Several project managers highlighted that tender evaluation criteria other than price can be crucial to supporting innovation. However, they felt that it is often difficult to define such criteria in ways that will allow for their proper assessment. Three of the project managers were, at the time of the interviews, managing projects that had an innovation bonus in the contract. They testified that it was difficult to assess innovation in accordance with the prevailing evaluation system and specifically noted a lack of “proper” qualitative criteria. Other project managers also stated that they struggled with how to create incentives structures that promote innovation.

Regarding targets, the findings suggest that the interviewed project managers understood the general vision and direction for promoting innovation to involve “more innovation” and developments in a general and nonspecific sense. Some of the participants emphasized the importance of creating a shared vision to facilitate innovative supplier efforts, including client representatives being responsive if possibilities for innovation emerge. What innovation means and, subsequently, what innovation is expected to achieve, is understood as something ambiguous and difficult to define. One project manager stated:

Generally, contractors have a lot of good ideas. They want to do the project more efficiently and maybe save some money for themselves as well for us, who knows, what we can do is to create possibilities and incentives for the contractor to be creative and solve problems – Project manager H

Indeed, project managers stated that innovation and development need to take place continuously in all projects if improvements in long-term performance are desired. However, they did not express clear insight about which type of innovation and development should be used. In this context, the project managers generally suggested that suppliers should propose innovations and felt that their role involved facilitating the assessment needed to decide on the potential implementation of such propositions.

The broad task definitions associated with soft PM-approaches can be linked to two common actions at STA, i.e. using design-build-contracts (DB) and formulating performance-based specifications (PBS). Interestingly, nearly all of the interviewees highlighted and discussed these actions as the two main principles of supporting innovation, with one sharing:

If I use a DB contract and PBS, it is all up to the contractor to come up with innovation; you provide the opportunity on the market-level. – Project manager J

One project manager elaborated on how the use of PBS can stimulate contractors to propose innovative solutions:

What we can do is to try to keep as many specifications as possible performance-based. Then, if the contractor comes up with a new solution that still meets the requirements, they can keep the money [here the project manager is referring to the potential gain resulting from using an alternative solution], so they feel there is a win-win situation to smart and creative work – Project manager H

However, the findings also highlighted some issues concerning the activities that are supposed to play a strong part in supporting innovation. Project managers raised the concern that the use of DB-contracts may have been “exaggerated a bit too much” and, subsequently, may not have provided the expected positive results. They thought that the DB-contracts used at STA were too restrictive to provide enough freedom for the contractor to actually choose and use new solutions. Concerns about the DB-contracts being too costly (and risky) for contractors to calculate, which could hamper competition, were also raised. One of the project managers explained:

We hear it all the time from our contractors; our DB contracts are so locked up [providing very detailed directions] that there is not point of having them. And then [referring to contractors], it costs a lot of money to calculate a DB contract and hand in such a tender – Project manager M

Moreover, the PBS were sometimes perceived as “forced” by project managers, meaning they were seen as “technical specifications in disguise.” Thus, the interviewees concluded that they were not able to provide their suppliers with the extent of freedom they may have envisioned, and which was needed to stimulate innovation. Or, as one project manager indicated, there may be conflicts between what the project manager wants to do, taking one specific perspective into account that conflicts with preferred actions from another:

Basically, you would like to control and specify everything concerning performance, but you could say that we have failed in that sense, since we have been specifying a bit too much in detail, e.g. prescribing specific technical solutions for how we think things should be done – Project manager L

In line with how soft management approaches promote innovation, the findings further suggest that project managers saw the need to enable contractors to consider multiple solutions in projects. The explicit actions that allowed multiple solutions to be explored were primarily linked to procurement-related tools. For example, project managers repeatedly highlighted that building on new land better supports innovation because this entails higher flexibility in location and land use, which allows contractors to explore a wide range of technical solutions.

The findings demonstrate that STA projects have relatively high stakeholder involvement during the early design phase. Transport infrastructure projects concern large areas of physical space and thus tend to have an impact on local communities. According to road legislation, it is mandatory to inform and respond to public interests when developing transport infrastructure. This process takes place during the design phase. Furthermore, the findings suggest that project managers recognize the need for facilitative practices among the project group to promote innovation. Project managers emphasized that client-supplier trust was crucial to stimulating innovation. Project managers also acknowledged their role in building relations, namely, evaluating and considering new ideas and solutions, scheduling time for collaborative activities (e.g. field visits) to create a common view of the project goals, working through conflicts, facilitating informal communication.

At the same time, the project manager emphasized that nonfacilitative practices may hamper innovation. This was particularly relevant for the client-supplier relationship in projects. The project managers suggested that a potential conflict in the relationship may arise when the consultant, who is responsible for the quality audit and the contractors, presents new solutions that oppose the design initially proposed by the consultant. The project managers felt that the consultants were prone to favor their own proposed solution and thus neglect to take the contractor’s solution under careful consideration. For this reason, the interviewed project managers emphasized the need for trust to manage these types of conflicts and facilitate a more collaborative project environment. As one project manager expressed:

Sometimes I get the feeling that the consultants get defensive when the contractor is proposing a new solution, the consultants think they have come up with the best solution and are not willing to be open to the idea that a better solution might exist. – Project manager G

Although project managers understood the need for stakeholder involvement in the context of implementing innovation, the findings suggest that project managers often considered such involvement to be challenging and, sometimes, even hamper innovation. The interviewees provided several examples of how the management of stakeholder interests during the design phase might be a distraction that stifles innovation due to early design constraints, for example:

- Co-financing makes it difficult for the project manager to control specific design features; hence, they need to add specific design constraints to the project.
- Owners of other infrastructure element tend to have a restrictive stance toward technical solutions.
- Interacting with authorities during the design phase constrains the design; authorities tend to demand detailed technical solutions early on to assure that STA can fulfil their promises.

When discussing innovation during on-site production, the project managers noted that changes are inevitable and should be facilitated. Furthermore, the findings suggest that the project managers had a sound understanding that innovation is typically associated with unforeseeable uncertainty in terms of new variables and/or effects that could not be anticipated at the outset. Several of the interviewed project managers viewed this as a challenge. First, new positive effects from innovation may be difficult to evaluate since project managers are bound to evaluate solutions based on the contract. Second, allowing for new solutions via PBS may, according to the project managers, come at the expense of losing value along the way. For example, aesthetic values might change (and be lost) if a new technical solution is chosen. One project manager shared their experiences of trying to use PBS in a tunnel project as follows:

We had aesthetical ambitions regarding a tunnel in the project; however, this solution was tied to a certain technical solution, and we had ambitions to describe the solution with PBS to allow for contractors to come up with a smart solution that we did not consider [...] however, if we were open to other solutions we had to modify our aesthetical requirements and have multiple requirements depending on what solution the contractor wanted to select, which quickly became very complicated to describe in a contract – Project manager D

In other words, new effects or variables due to changes may present a risk, including losing the value embedded in a known technical solution. Furthermore, project managers also expressed some concerns regarding the uncertainty they see in PBS. For example, project managers found it difficult to embed long-term considerations into PBS. For instance, the project managers shared the fear that the expected quality may not be achieved due to difficulties in controlling PBS, including being unable to assure long-term performance without specifying detailed technical solutions at the outset. One of the interviewed project managers shared:

[...] for example, drainage is a complex area. From my point of view, it is risky to specify what we want using PBS. So, that's why we have prescribed technical solutions in the tender documents – Project manager K

#### *4.2 Assessment of the hard project management approaches used in Swedish transport administration projects*

Despite the findings indicating that soft PM-approaches need to be in place to facilitate innovation, the interviews and studies of the formal project processes revealed that hard PM-approaches are commonplace in the management of STA projects. Findings from archival data and interviews suggest that the project manager role is intimately tied to delivering the project on time, within budget, and in line with defined specifications. According to the formally defined project process at the client organization, the project managers are responsible for providing the deliverables within the predefined project process. This process has several toll-gates, with performance associated with time, cost and scope is assessed at every toll-gate.

Although project managers tried to appeal to soft success criteria when assessing and promoting innovation, the findings suggest that these ambitions were rather unsuccessful as hard success criteria were applied instead. The interviewed project managers experienced that the primary evaluation of project progress relies on metrics related to time, cost and scope. These follow-up evaluations were conducted continuously by both the project manager's closest superior and the internal client to check project progress in relation to budget and schedule. The interviewed project managers shared that no continuous evaluation considered how the project was succeeding in terms of potential innovation or development efforts. Instead, efforts to evaluate innovation were made once – during the procurement of suppliers – to categorize the project as a “DP-project” or not.

Furthermore, despite the perceived need for qualitative success criteria to evaluate suppliers, quantitative success criteria, which were almost exclusively linked to price, dominated evaluations. Notably, all of the interviewed project managers reported only using price as an evaluation criteria in the project they were currently managing. One project manager described this issue as:

We did have a discussion on whether or not we should use alternative tender evaluation criteria, other than price, but it ended up to only include price [...] but still, you would like to reward those who already have some good ideas at the tender stage. . . – Project manager G

The specific targets of the projects were in line with hard PM-approaches; more specifically, the targets were given from above by the internal client at the Department of Planning, with predefined goals with a given set of resource constraints expressed in time, cost and scope. Furthermore, given the nature of these investment projects, the projects have a clear, tangible physical artefact in the form of transport infrastructure that is to be developed.

The findings suggest that project managers consider the combination of hard targets with hard success criteria to challenge efforts to promote innovation. Although project managers reported that they are able to make changes to the predefined project targets, these possibilities were perceived as limited, challenging and sometimes even impossible. In practice, if a supplier presents an innovative solution that deviates from the initial scope or challenges budget and time constraints, the interviewed project managers felt that they have a limited mandate to promote such emerging opportunities in the projects they manage. In such instances, the decision on how to respond to supplier propositions depends on the approval of the internal client. During interviews, project managers described this process as slow and time-intensive, both of which would discourage the client project managers and suppliers from proposing, evaluating and implementing innovations. For example, one project manager stated:

What we report to our internal client is time, cost and scope; if we are progressing according to plan. And, we could ask for more money and time if we want to change the scope, that possibility always exists, however it is rather difficult depending on how large the change is and it may need several levels of management approval. – Project manager I

Due to the perceived difficulties in challenging the predefined targets set by internal clients, the interviewees suggested that any proposed solution that deviates from the initial plan and solutions needs to entail an explicit benefit, typically expressed in terms of a trade-off between time, cost and scope, for the project manager to consider making changes. This dynamic was illustrated by one of the interviewed project managers:

[...] if the contractor proposes a product that is of similar quality or will have a lower price you can always find a way to make a deal, there is always the economical way to go – Project manager J

Even though the project managers felt that projects need the flexibility that enables the consideration of multiple solutions to promote innovation, findings identified contradictory practices at STA support activities associated with the refinement of one solution. This is relevant to the division of design and production, with a consulting firm leading the design phase and a contractor leading the production phase (standard and most commonly used procedure). During the design phase, the consulting firm tasked with developing the road- or railway plan needs to make sure that a viable solution for the project exists. Furthermore, the road legislation states that the STA is not allowed to acquire more land than is necessary. Project managers felt that this constraint aims to minimize land exploitation. A way to ensure this is to develop a plan with a specific technical solution in mind; several of the interviewed project managers supported this approach. However, a few of the project managers shared that this approach to road- or railway plan will embed a certain technical solution in the plan, even though this is not the goal of such plans. Thus, the road legislation was perceived as a limiting factor for the consideration of multiple solutions and the subsequent potential innovation during the production stage (when the contractor gets involved in the process). Even though the process can be reversed, this takes time and – according to the project manager interviews – is rarely considered a viable option. Project managers explained that constraints due to early design decisions tend to limit what technical solutions contractors can choose, as well as how the work is carried out, which is exemplified by the following statement:

We neglect ideas due to the spatial limits that the road plan includes. Let's say a contractor proposes a new solution for a bridge that will save us 10 million, but this would require that we exploit some more land. Then we have to consult land owners, the county board, the municipality, which takes time and costs us money [...] – Project manager M

In addition, the findings suggest that project managers felt that several practices associated with narrow and clear task definitions can hamper innovation. The project managers suggested that both internal STA regulations and technical support may hamper the ability to use alternative solutions, which can be expected to negatively affect innovation. The internal STA regulations need to be incorporated into the infrastructure design, with the objective of providing standards that assert a specific quality of materials in railways as well as secure maintenance and regulate the long-term quality of the infrastructure. Project managers experienced that the internal regulations and guidelines are overly exhausting and rigid, which, therefore, restrained the possibilities for innovation in projects. Regarding internal technical support, project managers suggested depend on internal technical support for the approval of innovations and that these specialists may not have the incentives to accept innovation – which they may view as being associated with risks of technical failure. The interviewed project managers also suggested that the internal technical support at STA tends to recommend using technical solutions instead of PBS, which was considered to hamper innovation.

Even though the findings indicated that project managers understand the need for changes and the uncertainty associated with innovation, disagreed with the contractor about risk, i.e. the project managers were more risk averse when considering new the issue that changes are challenging and are easily viewed as undesirable was identified by several project managers. The need to present a viable solution before any contractor is involved – as was discussed above – means that many design considerations may be decided upon in the early project stages. This requirement creates a situation in which any new solutions are always compared to the existing base-line solution. Changes and potential innovation proposed by the contractor will then, either formally or informally, be compared to the

solution that has already been embedded in the plan. A central issue then becomes the perceived risk in accepting changes and innovation. Several project managers concluded that – in some instances – they had disagreed with the contractor about risk, i.e. the project managers were more risk averse when considering new solutions.

According to interviewees, most of the challenges relating to accepting changes and potential innovation proposed by suppliers can “be worked through.” However, the project managers also implied that this is time- and resource-intensive. For example, the evaluation of ideas may require involving the internal client and technical-support expertise. Moreover, project complexity, as well as workload typically increase when contractors contribute novel ideas; this is not only due to negotiations with suppliers but also to the need to consider how the changes may impact other project stakeholders. All actions take time, and there is always the risk that the proposed change will not be implemented due to a negative decision or that the new solution will have unexpected consequences. Moreover, as one project manager explained, managing change is not something that can be easily managed in any contract:

If we want to change anything we need to go negotiate with our stakeholders and that can be exhausting [...] we have different roles [clients and contractors] which we need to be aware of [...] as clients we need to take into account the surroundings, which might be too complex and difficult to put into a contract – Project manager D

Regarding project changes, the client organization has defined routines and guidelines that determine how uncertainties (both risks and opportunities) are identified and estimated in projects. The practice can be described as risks that confer estimable changes in known project variables.

## 5. Discussion

The findings show that project managers’ views and understanding of how transport infrastructure projects should be managed to drive innovation includes the application of soft PM-approaches. The findings suggest that the *project manager* role involved both the responsibility of delivering the project on time and within budget (hard PM) and the objective of creating business results and value beyond the scope of the project (soft PM). This finding suggests that these project managers need to balance both hard and soft PM-approaches to sufficiently facilitate innovative work while meeting clearly defined demands; this agrees with what was presented by both Eriksson *et al.* (2018) and Koppenjan *et al.* (2011). However, the findings also revealed that a strong emphasis on hard PM-approaches can overshadow soft PM-approaches and – as stated by the interviewees – hamper efforts in driving innovation; other researchers have identified similar dynamics in organizations (Keegan and Turner, 2002). The challenges associated with combining both hard and soft PM-approaches in transport infrastructure projects are discussed from a client perspective in the following section, including a summary of how this strategy impacts the client’s ability to drive innovation.

It is notable that the interviewed project managers viewed innovation as necessary for achieving long-term business results. The findings also suggest that the project managers perceived a need for qualitative *success criteria* to evaluate innovation (in line with e.g. new success factors for construction projects discussed by Charles *et al.*, 2022). Although the project managers expressed a desire to value the innovation proposed by suppliers, they nevertheless felt that this is challenging because they lack the tools for such purposes. Instead, there was a strong reliance on hard PM-approaches, which measured operational success in terms of project completion on time, within budget and in line with performance

metrics per the organization's formal project process, including routinely follow-up evaluations. The project managers responded to this challenge by stating that innovation typically needs to demonstrate benefits in relation to time and cost and thereby align with the established hard *success criteria*.

The interviewed project managers also noted that they are tasked with managing projects toward both predefined project objectives and *targets* associated with innovation. The project managers had a general vision of increased innovation in their projects. However, they were lacking a clear direction regarding *targets* associated with innovation. This was because there was a lack of concrete measures that defined and articulated what innovation was supposed to accomplish. Furthermore, the fact that targets were given from above by the internal client is in line with a hard PM-approach (Davies and Brady, 2016; Lenfle and Loch, 2010); this showed that it is generally not up to the project managers to decide the scope of the project beyond predefined objectives. Under such a PM-approach, the strategic purpose of the project is defined outside the realm of PM (Lenfle and Loch, 2010); as such, the task of setting innovation targets would fall to the internal client. However, the findings suggested that these types of innovation targets were lacking. Based on the interview responses, it seemed as though the project managers had to prioritize the targets related to measurable metrics, such as time, cost and scope, over more broadly defined goals related to innovation.

It became clear that project managers are challenged by creating *activities* that support broad task definitions and managing the multiple solutions that stem from innovation. The project managers viewed procurement-related tools as important measures for facilitating multiple solutions and broad tasks to promote innovation. However, the project managers faced challenges when attempting to use these tools purposefully. The development of new transport infrastructure is essentially a process during which project managers support the refinement of one solution; this approach is in direct conflict with the desire to address and consider multiple solutions. The project managers also faced difficulties due to the lack of tools for evaluating multiple solutions. This can be interpreted to reflect a lack of soft success criteria related to innovation at the client organization, which also makes it difficult to implement activities based on soft PM-approaches. Furthermore, the focus on procurement also indicates a separation of soft and hard approaches, with soft approaches used in early project phases and hard approaches used in the execution phase of the project. From this perspective, multiple solutions are only considered in the early design phase, after which a choice is made that will explicitly structure the project targets.

The interviewed project managers were challenged with managing the stakeholder involvement necessary for adequately responding to emerging opportunities. When considering *stakeholder involvement*, soft PM-approaches are – in the view of project managers – considered necessary for implementing change and innovation in projects. This is in line with what has been reported in previous research, i.e. participative approaches are facilitators of innovation (Crawford and Pollack, 2004). However, the findings also suggest that project managers felt that it is difficult to involve external stakeholders because this is a time-consuming process. Stakeholders can be a source of complexity (Koppenjan *et al.*, 2011), with previous research suggesting that nonparticipative approaches lead to faster project completion (Crawford and Pollack, 2004). Thus, project managers are faced with balancing the time required to gain the advantages of soft PM (e.g. high stakeholder involvement) with the operational success criteria associated with hard PM-approaches. The interview responses analyzed in this study suggest that the client organization places a strong emphasis on operational success, which discourages project managers from involving external project stakeholders.

A major challenge for all project managers is responding to potential *project changes*. Change and uncertainty is an inherent characteristic of innovation, and – according to the interviewed project managers – key to promoting innovation in projects. Previous research has suggested that soft PM-approaches are necessary to dealing with changes in construction projects (Eriksson *et al.*, 2018). However, project managers found change and accepting innovation to be challenging concepts; more specifically, the findings identified three inter-related PM-approaches that help explain the difficulties perceived by the project managers. First, new solutions and innovations are associated with unforeseeable uncertainty in the form of new effects or variables that cannot be accounted for at the project outset (Lenfle and Loch, 2010). Evaluating new effects becomes problematic for project managers who have a contractual relationship with the suppliers. The perceived difficulties in creating soft success criteria exacerbate this problem of accepting project changes. This would suggest the need for a paradigm shift in how soft success criteria are viewed and integrated into projects, as the current structure is not favorable for changes and innovation. Second, activities in the project process are generally supported by hard PM-approaches that support the refinement of one solution, which locks in solutions early on. This approach builds on an underlying assumption that all of the activities can be planned beforehand and rely on routine execution (Crawford and Pollack, 2004). Thus, any proposed change fundamentally contradicts and challenges this assumption and, subsequently, project success. Third, the findings suggest that project managers feel that changes are difficult to implement. More specifically, project managers consider changes to be risky, time-consuming and resource-dependent. These requirements of accepting changes and fostering innovation can be compared with the expectation that the project will achieve the hard success criteria (usually specified by the project manager's superior). When considered from this perspective, it will be difficult to make changes and foster innovation in the projects of a large, public organization.

Previous research has suggested that hard PM-approaches create a context that may hamper innovation in projects (Keegan and Turner, 2002; Lenfle and Loch, 2010; Toole *et al.*, 2013). The findings presented in this paper support previous research, which suggests that PM in the construction sector is dominated by hard approaches (Eriksson *et al.*, 2018; Koppenjan *et al.*, 2011). The interviewed project managers expressed a need for more soft PM-approaches to promote innovation in projects; they particularly highlighted aspects such as high stakeholder involvement, being able to accept changes, and applying soft success criteria to evaluate project performance. However, it became clear from the interview responses that – when faced with challenges – project managers will revert to hard PM-approaches in favor of soft approaches. Karrbom Gustavsson and Hallin (2014) argue that hard PM-skills and methodologies may benefit from a higher status than “soft” ones, which may limit the spread of soft approaches. The findings from this study partly support this notion, as it seems that hard approaches are prioritized over soft approaches, possibly due to the pressure to achieve the targets set by superiors. The presented findings provide some support for the view that the PM-discipline is still dominated by hard PM-approaches, which is a common criticism found in the literature (Cimil and Hodgson, 2006; Engwall, 2003).

## 6. Conclusion

By adopting the hard and soft approaches from the PM-literature to assess STA project managers' views of how to manage STA DP projects, we found that:

- The views of project managers on what is needed in PM-practice to purposefully and successfully promote development and drive innovation in STA transport infrastructure projects is well in line with notions and aspects from PM-literature on soft PM.

- Yet, the views of project managers confirm the dominance of a hard PM-approach at STA, even in DP-projects. The challenges of managing DP-projects expressed by project managers could be illustrated and understood in terms of emerging conflicts between aspects of a dominant hard approach and aspects of a soft approach introduced to support “development promoting PM.”

Findings reflect a situation where operational success criteria emphasize project completion on time and within budget, even in DP-projects. The emphasis on hard aspects related to targets and success criteria seems to constrain project managers in considering multiple solutions, involving various stakeholders and accepting project changes (stretching beyond estimable changes in known project variables). Consequently, soft PM-approaches recognized as relevant by both project managers and PM-literature (Shenhar and Dvir, 2007) are not sufficiently used to create the grounds required for fostering innovation.

Previous research has pointed out that large public client organizations often have the potential to promote innovation (Ivory, 2005; Loosemore and Richard, 2015). Yet, in line with propositions by (Keegan and Turner, 2002; Toole *et al.*, 2013), our research show that conflicting demands relating to hard and soft PM-approaches may have significant impacts on client organizations in the construction sector that have ambitions for driving innovation. One important implication of the findings is that clients cannot simply “add” soft practices but need to take a comprehensive approach toward PM and recognize its importance in creating a context that facilitates innovation. Thus, acknowledging the frequently stressed importance of the role of clients as drivers of innovation, our findings demonstrate the need to explore further the subsequent implications of hard and soft PM. Indeed, for large public clients such as the STA to shoulder this role may well-depend on their ability to challenge and rethink the current project-management practice.

The research presented in this paper problematizes the role of client organizations in driving innovation in the construction sector based on limited empirical material excerpted from a case study conducted within the STA Department of Investment in 2017. Acknowledging limitations due to the research design and scope of the study, along with the importance of the proposed implications of findings for PM-practice and construction innovation, we strongly advise further studies to extend and reflect a broader (soft PM-) scope of various project stakeholders’ views. Furthermore, findings indicate that the clients’ project managers have certain beliefs about how the process of planning and design limits construction innovation in transport infrastructure projects that is not fully explored in this paper. This may also be of interest to explore in future studies.

#### Note

1. The formal process of managing investment projects at STA follows a few general steps and includes several tollgates that act as decision points for progressing to the next stage. First, project managers are assigned to plan the project after receiving a project order. When the project plan is negotiated and accepted by both the project manager and internal client (e.g. time, cost, scope and procurement strategy), a consulting firm is procured to develop a road- or railway plan (and possibly a production document depending on the contract type). The road- or railway plan (depending on what type of infrastructure is being built) states what type of transport infrastructure can be built and what land STA can use when developing the project. After the road- or railway plan is accepted (generally through the local county), a contractor is procured and production starts. In general, the follow-up of the contractor is done with the help of a consulting firm.

In agreement with research arguing that large client organizations that repeatedly procure construction projects have better conditions for promoting innovation in the construction sector, the Swedish Government directive from 2010 explicitly states that the STA is expected to increase innovation in the construction market (SFS, 2010, p. 185). As part of the organization's subsequent efforts to promote innovation, STA in 2016 developed guidelines for actions that – when implemented in projects – were considered to foster innovation by providing a supportive context (TDOK 2016:0073). Accordingly, some projects were internally selected and categorized as “development-promoting” (DP). The formal process of managing investment projects applied also to DP-projects.

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