

The reasoning behind infrastructure manager's choice of procurement instruments

Procurement
instruments

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Henrico Plantinga

Procurement Department, ProRail, Utrecht, The Netherlands, and

Hans Voordijk and Andre Doree

*Department of Civil Engineering,
Faculty of Engineering Technology,
Twente University, Enschede, The Netherlands*

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Abstract

Purpose – The purpose of this paper is to show that for frequently procuring public clients: the reasoning behind the use of procurement instruments is a process in its own right that requires managerial and scientific attention; modeling this process contributes to making sensible procurement choices; and managing this process is a relevant factor in the client's development toward strategic procurement.

Design/methodology/approach – A model is developed to conceptualize the reasoning behind procurement instruments. Using this model in a case study, the reasoning behind the evolution of a particular procurement instrument as applied by a public infrastructure management organization is reconstructed.

Findings – The case study results show that an initially explicitly formulated set of main reasons for operating a qualification system can implicitly evolve over time into a different set of reasons. From a managerial point of view, explication of implicit reasons is important to both avoid the risk that the real value of the procurement instrument remains undetected as well as properly assess its strategic alignment with higher level strategies. The conceptual model proves to be a useful tool to support that.

Originality/value – Bringing the reasoning behind the use of procurement instruments to the fore, this study explores an area of construction procurement research that is positioned between the disciplines of purchasing and supply management, knowledge management and strategic management.

Keywords Knowledge management, Case study, Strategic management

Paper type Research paper

1. Introduction

Public sector organizations are expected to achieve high performance standards in public service provision (Boyne and Walker, 2010). Since governments have been increasingly outsourcing public service provision to the private sector (Alonso *et al.*, 2013), public performance is also increasingly influenced by the appropriateness of the procurement strategies that clients apply to procure works, services and supplies. However, creating the most appropriate procurement strategy for a given situation can be a complex process. During that process, clients need to make a number of procurement choices that are key to achieving high performance.

For procurement in the construction industry, literature provides various examples of such key procurement choices. One key choice concerns the selection of the most appropriate procurement system for a given project (Rajeh *et al.*, 2015). Procurement systems used in construction today include design-bid-build, design-build, alliancing and public private partnerships. Given the common view that “a “one-size-fits-all” approach to procurement is unwise” (Walker and Rowlinson, 2008b, p. 41), many methods for selecting the best approach have been proposed (see Love *et al.*, 2012; Rajeh *et al.*, 2015 for overviews). Other key choices include selecting the most appropriate tender procedure (Carbonara *et al.*, 2016; Ramsey *et al.*, 2016), the best method for contractor



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selection in the prequalification stage (Faikcan and Hakan, 2016; Holt, 2010) or in the tender evaluation stage (Ballesteros-Pérez *et al.*, 2015; de Araújo *et al.*, 2017; Walraven and de Vries, 2009).

There is one thing that all these procurement choices seem to have in common. This concerns the input to making the choice: alternative procurement systems, tender procedures, supplier selection methods, and contract award methods are assessed and compared by attributing certain features to each of the alternatives under consideration. Dependent on the match between these features and a range of criteria, one alternative is favored above others (Luu, Ng and Chen, 2003; Rajeh *et al.*, 2015). Apparently, some form of reasoning takes place in the client's organization that results in this attribution of features. However, the quality of the reasoning involved may affect the quality of the procurement choice. It appears therefore that a thorough understanding of the process by which features are attributed to procurement options is conditional to creating appropriate procurement strategies.

While literature on methods to support procurement choices is abundant, the attribution of features to procurement options by practitioners (from here: the reasoning process) has received less attention. This study endeavors to explore this reasoning process as a process in its own right. It aims to assess its managerial and scientific relevance by posing the following questions:

RQ1. Why regard the reasoning process as a process in its own right?

RQ2. How would modeling this process contribute to making sensible procurement choices?

RQ3. How do these insights contribute to the development of strategic procurement?

The third question interprets the previous answers from the generic perspective of strategic procurement. In the Purchasing and Supply Chain Management literature, procurement has long since been recognized as a strategically significant function (Chen *et al.*, 2004; Ellram and Carr, 1994; Ubada *et al.*, 2015). Several factors, including the level of involvement in strategic planning, the status, the knowledge and skills, and the level of integration of the procurement function are relevant for developing strategic procurement in an organization (Carr and Smeltzer, 1997; Cousins *et al.*, 2006). The value of examining the reasoning process is therefore assessed by its potential contribution to the further development of strategic procurement.

The paper addresses these questions as follows. First, the reasoning process, its locus and its output is described and illustrated in more detail. Second, a conceptual model for examining and managing the reasoning process is introduced and tested in an empirical case study. Finally, the conceptual model and case study findings are used to discuss the relevance of the reasoning process from the generic perspective of strategic procurement.

2. The reasoning process: locus and illustrations

The general context of this study concerns public procurement in the construction industry. Within this sector, infrastructure managers such as highway and railway agencies commonly are major clients. Such organizations commonly have large ongoing construction portfolios rather than one-off construction projects and thus find themselves in a "multi-project environment" (Aritua *et al.*, 2009; Blismas *et al.*, 2004).

Public procurement refers to the process by which public authorities, such as government departments or local authorities, purchase work, goods or services from companies. Procurement has been frequently confused with the terms "commissioning" and "purchasing" (Murray, 2009). Here, we follow Murray's (2009) differentiation which, in short, implies that procurement partly overlaps with commissioning activities, while it completely encompasses purchasing activities.

The focus of this study is on the reasoning behind the methods, systems and documents by which procurement is carried out. This reasoning presumably occurs during certain procurement processes. Therefore, this section first identifies these procurement processes and then singles out the reasoning process.

Purchasing and supply management literature has defined four to ten key processes to describe organizational buying (Ateş *et al.*, 2018). Organizational buying typically includes processes that range from specification, supplier selection and contract agreement to ordering, expediting and evaluation (Van Weele, 2010). However, for multi-project organizations, the processes described by PMBOK (2013) match better to the project context. PMBOK (2013) identifies four “project procurement management processes”: plan procurement management, conduct procurements, control procurements and close procurements.

The plan procurement management process is particularly illustrative here. It concerns “documenting project procurement decisions, specifying the approach, and identifying potential sellers” (PMBOK, 2013, p. 357). The output of this process includes a procurement management plan, which, amongst others, describes the type of contract to be used, evaluation criteria and procurement documents. In other words, the procurement management plan documents the key procurement choices.

The procurement management plan may also describe how the choice was made (the selection method), and why (the justification). In general, the choice for a certain type of contract, set of evaluation criteria or procurement document is based on a comparison of alternative procurement instruments (Luu, Thomas Ng and Chen, 2003). To enable this comparison, certain features must be attributed to these instruments. These features help to answer why a particular alternative is most appropriate.

It is this attribution of features to procurement instruments that this study hones in to. Alluding to it as the “reasoning process,” it aims to separate this reasoning process from main processes such as the plan procurement management process. The reasoning process is thus viewed as a sub-process that occurs during, or is triggered by, several main processes by which procurement is carried out.

To explore the locus of the reasoning process, this study employs a categorization of processes that is different to the organizational buying processes mentioned above. It identifies the processes by which the client maintains, applies and (further) develops procurement instruments. So instead of following the “life cycle of the agreement” (PMBOK, 2013, p. 356), this categorization follows the life cycle of single procurement instruments.

This procurement instrument life cycle perspective is based on the phenomenon that multi-project public clients commonly maintain a set of standardized procurement instruments. Maintaining such a set is argued to create time and cost efficiencies, a range of contracting options, ease of use and compliancy to legislation and policy (e.g. Australian Government, 2007). Literature examining this particular perspective is scarce. However, as the content of this set of standardized procurement instruments may change over time, we suppose that the following four main processes are run in the client’s organization:

- (1) selection process;
- (2) (re-)development process;
- (3) re-use consideration process; and
- (4) portfolio configuration management process.

Again, we also suppose that the reasoning process occurs as a sub-process within each of these four main processes. To support this assumption, the processes are now described in more detail. For the first process, literature is cited to exemplify the output of the reasoning process. For the other three, we argue why the reasoning process occurs.

2.1 *The selection process*

The PMBOK (2013) plan procurement management process involves selecting the most appropriate procurement instrument out of a range of alternatives. On a high level, this concerns the selection of the most appropriate procurement system (Love *et al.*, 2012). Since the move away from traditional procurement (Egan, 1998; Latham, 1994), a range of alternatives has been developed including Design & Build, Design-Build-Maintain, Private Finance Initiative, Partnering and Project Alliancing (Walker and Hampson, 2008a). Based on the view that there is no “one size fits all” approach to procurement, public infrastructure managers are currently advised to consider per project which alternative best matches the needs of each project (see e.g. reports issued in the UK (Treasury, 2013), the Netherlands (Jansen, 2009) and Sweden (Eriksson and Hane, 2014).

It has been asserted that in practice, procurement selection decisions are founded on experiences of previous similar examples. These experiences are coupled with intuitive evaluations to set the distinctive requirements for the current procurement situation (Luu, Thomas Ng and Chen, 2003; Masterman and Masterman, 2013).

Literature provides examples of the input that practitioners bring forward during the selection process. Love *et al.* (2012) report on a case study in which Design & Construct (D&C) and Traditional Lump Sum (TLS) variants are compared for a school construction project. While scoring the appropriateness of the variants against a set of criteria, reasons to support the scores are provided. Two citations may illustrate the reasoning singled out in our study: “D&C routes provide maximum ability for contractors to add value in design”; and with TLS “a greater level of design quality may be anticipated” (Love *et al.*, 2012, p. 319). Arguably, reasons such as these are based on the practitioners’ understanding of the outstanding features of the procurement systems in question.

Once a procurement system is selected, additional selection processes need to be carried out. Procurement systems are merely high-level abstractions of procurement practice. To actually apply a procurement system, public infrastructure managers need to operationalize the conceptual procurement system into a concrete set of tender documents. Next to the contract with its annexes, terms and conditions, this also includes documents that describe and facilitate the tender procedure (documents explaining the tender process, templates for correspondence, etc.). In terms of PMBOK, these concern the procurement documents (PMBOK, 2013). Moreover, to execute the procurement process several other systems, methods and tools are used, such as prequalification systems and past performance measurement tools. Again, to denote all these systems, methods and tools, this study employs the term “procurement instruments.”

Literature also provides examples of reasoning process output at this procurement instrument level. In comparing supplier selection methods, Bergman and Lundberg (2013, p. 82) illustrate the kind of reasoning this study is exploring: “In non-complex situations, [...], lowest price, being a simple and robust supplier selection method, is to be preferred.” The features attributed to the lowest price supplier selection method here are that it is simple and robust. Such reasoning is also expressed by practitioners in, for instance, a project team session where a procurement strategy is devised, or in a procurement policy document.

2.2 *The (re-)development process*

The selection process presupposes that infrastructure managers dispose of alternative procurement instruments. However, the acquisition of procurement instruments requires scarce organizational resources. Clients may follow one of three routes to acquire procurement instruments and, arguably, take the required resources into account when deciding about the most appropriate route.

The first route is to apply generally acknowledged standards, such as the internationally applied FIDIC suite of contracts provided by the international federation of consulting

engineers (Bunni, 2013) or national standards such as the NEC3 Engineering and Construction Contract (Eggleston, 2015) used in the UK.

The second route is to “adopt and adapt” a general standard. This route involves a development process. For instance, NetworkRail, the UK’s rail infrastructure manager, maintains its own standard suite of contracts (which is publicly accessible on the internet). Some of these contracts include amendments to the UK’s general “Infrastructure Conditions of Contract (ICC).” For example, in operationalizing the Design & Build concept, NetworkRail’s “NR9” document contains amendments to the “ICC Design and Construct Version” (NetworkRail, 2018). Such adapted contracts are also alluded to as bespoke contracts (Meng, 2014).

The third route is to (re-)develop a new procurement instrument that is not based on a standard. This route involves a development process in which the client designs a procurement approach (potentially from scratch, or based on an external example), applies it in practice and then perhaps subsequently redesigns it. Examples of this third route are the redesign of project alliancing applications (Plantinga and Dorée, 2016) and the development from scratch of a contract award mechanism that stimulates suppliers to reduce CO₂ emission (Rietbergen and Blok, 2013).

Literature indicates that procurement systems are no stable concepts, but rather emerge and evolve over time as they interact with other procurement systems (Franz and Leicht, 2016; Lahdenperä, 2012), or are being critiqued for certain negative features (Love *et al.*, 2010). Clearly, the extent to which a client actively participates in this general evolution may vary. It does seem reasonable though to assume that multi-project clients will not restrict their procurement practices to the first route exclusively. The (re-)development process is therefore probably run every now and again in such organizations.

In the first route, literature (e.g. Hughes *et al.*, 2015) or external procurement consultants may provide a client with a set of reasons in the form of instrument features, describing which instrument is most appropriate in a given case. However, application of the second route, and especially the third route probably requires more in-depth, client specific knowledge and thus internal resources. To justify spending these resources, the motivation must be that instruments currently available to the client do not incorporate certain needed features. Thus, the reasoning process is also an important sub-process to the (re-) development process.

2.3 Re-use consideration process

To benefit more than once from newly developed procurement instruments, the client needs to consider the instrument’s potential for future reuse and subsequently follow up on the most appropriate strategy for sharing the gained knowledge within the organization. Codification, personalization and people finder are three main knowledge sharing strategies (Ragab and Arisha, 2013). The creation of contract templates (Argyres and Mayer, 2007) may serve as a typical example of the codification strategy. Knowledge sharing on new procurement instruments has much in common with the general topic of learning between projects (Hartmann and Dorée, 2015). However, yet, this particular organizational process of considering and facilitating the re-use of procurement instruments has received scarce research attention. Here, we allude to it as the “re-use consideration process.”

As with every process, running this process requires scarce organizational resources. Practitioners assumedly require a solid justification to start and complete it. Similar to the (re-) development process, it would only make sense to run this process if the new instrument has features distinctive from other instruments already in use by the client. So again, also in this process the reasoning behind the newly developed procurement instrument is key input to support decision making.

2.4 Portfolio configuration management process

Above it has been indicated that multi-project public clients use a set of procurement instruments that are standardized for general use in the client's projects. To our knowledge, literature does not apply a common term for this set. In this paper, it is alluded to as the "portfolio of standardized procurement instruments."

The portfolio configuration management process concerns the process of updating and changing this portfolio. Updates will be necessary due to changing legislation, changing procurement policy or improvement proposals received from its users. Also, either because instruments have become obsolete or new procurement instruments are added, its content will change over time. The relation between the four main organizational processes is illustrated in Figure 1.

Similar to the previous processes, the reasoning process is an important sub-process here, since decision making on portfolio changes and updates requires input in the form of features of procurement instruments.

2.5 Conclusion

While literature on the selection process may yield the most striking examples, it is not the only process in which the reasoning process occurs. This section introduced four main organizational processes that together describe the life cycle of procurement instruments. The attribution of features to procurement instruments is argued to be relevant for decision making in each of these main processes.

Having direct consequences for decision making, these processes form the formal loci of the reasoning process. However, the reasoning process also occurs in more or less informal settings. Next to generating lessons learned during the "close procurements process" (PMBOK, 2013), practitioner conversations over lunch, department meetings, trade journals and academic literature may also create or change practitioners' views on procurement instruments.

All these considerations indicate that the attribution of features to procurement instruments is an important process that occurs in many settings. While it influences decision making on the procurement strategy in single projects, it also influences the course of a procurement instruments' life cycle. Given all these occurrences, the reasoning process probably does not start from scratch every time again. There is rather some

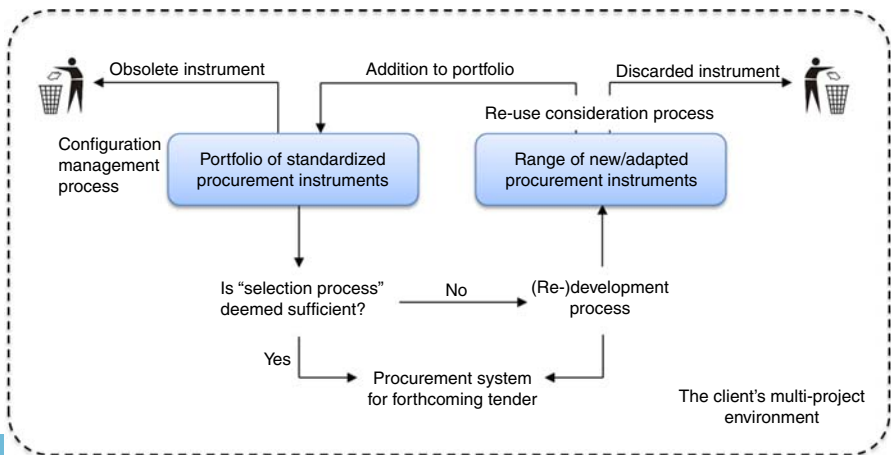


Figure 1. The life cycle of procurement instruments

consistency in how an instrument's main features are viewed within the client's organization. We conclude therefore that the reasoning process deserves to be examined as a process in its own right.

3. Model development

The previous sections proposed to view the attribution of features to procurement instruments as the output of a distinct process. Supposing the quality of its output affects the quality of decision making, the question emerges how the reasoning process can be managed. If it can be managed, then that would contribute to making sensible procurement choices. With this aim, this section proposes a conceptual model to analyze and manage the reasoning process. Its theoretical point of departure is primarily based on the concept of organizational knowledge (Tsoukas and Vladimirou, 2001).

The reasoning process involves organizational members who characterize procurement instruments in order to come to procurement choices. This concerns a form of knowledge processing. Tsoukas and Vladimirou (2001, p. 976) hold that "data, information, and knowledge are three concepts that can be arranged on a single continuum, depending on the extent to which they reflect human involvement with, and processing of, the reality at hand." Put simply, data require minimal human judgement, whereas knowledge requires maximum judgement. Thus, the reasoning process involves the processing of knowledge rather than data.

Knowledge is an elusive concept. Tsoukas and Vladimirou (2001) describe knowledge as the individual capability to draw distinctions, within a domain of action, based on an appreciation of context or theory, or both. Translated to this study, the output of the reasoning process is thus dependent on the capability of the practitioner(s) to distinguish one procurement instrument from another. The domain of action may concern one of the main processes described above. The context may include a certain type of projects, market segment or set of organizational objectives.

While individuals may draw from own previous experiences with particular procurement instruments, they can also be influenced by organizational knowledge. Organizational knowledge has been described as "the capability members of an organization have developed to draw distinctions in the process of carrying out their work, in particular concrete contexts, by enacting sets of generalizations (propositional statements) whose application depends on historically evolved collective understandings and experiences" (Tsoukas and Vladimirou, 2001, p. 983). We view a statement like "D&C provides maximum ability for contractors to add value in design" as such a generalization. Although it may be based on a practitioner's personal experience, it may as well concern a historically evolved collective understanding that the practitioner draws from.

3.1 *Argumentation and generalization*

The reasoning process amounts to articulated expectations or predictions of the empirical effects of a procurement system, or a specific procurement instrument, in the forthcoming project(s). The reasons function as arguments for or against particular options. Therefore, reasoning containing predictions is alluded to here as "argumentation."

As described above, we hypothesize that such argumentations are often based on empirically observed effects that are expressed in the form of generic statements (generalizations). This links with the notion of organizational knowledge in the sense that "individuals draw and act upon a corpus of generalizations in the form of generic rules produced by the organization" (Tsoukas and Vladimirou, 2001, p. 979). The process leading up to such statements is assumed to be similar to the concept of theorization. Theorization concerns "the self-conscious development and specification of abstract categories and the formulation of patterned relationships such as chains of cause and effect" (Strang and

Meyer, 1993, p. 492). To make it practical, the creation of generalizations may for instance be stimulated by organizing lessons-learned sessions (Carrillo, 2005).

The term generalization is also used here to reflect the possibility that the statement may not be true for all past experiences. For example, D&C may not have added value in the design of a particular project because the contractor's design team underperformed due to a temporary lack of design capacity. As such, there is also a risk that generalizations may be based on defective induction.

To sum up, argumentations and generalizations represent the reasoning used in the four main processes. They represent and express patterned relationships that are abstracted from a complex reality and attributed as features to procurement systems or single procurement instruments.

3.2 Knowledge management

The idea that knowledge can be managed has given rise to a vast amount of literature (Serenko *et al.*, 2010). Literature on knowledge management (KM) in the construction industry has also long since been increasing (Anumba *et al.*, 2008; Kamara *et al.*, 2002; Tan *et al.*, 2010). The KM literature identifies at the minimum four basic KM processes or phases: knowledge creation and acquisition; storage and retrieval; transfer and sharing; and knowledge application (Alavi and Leidner, 2001). Although other scholars identify up to ten processes (Ragab and Arisha, 2013), to keep our model simple the four basic KM phases suffice. These form the base structure of our model, on which, subsequently, the reasoning process is mapped.

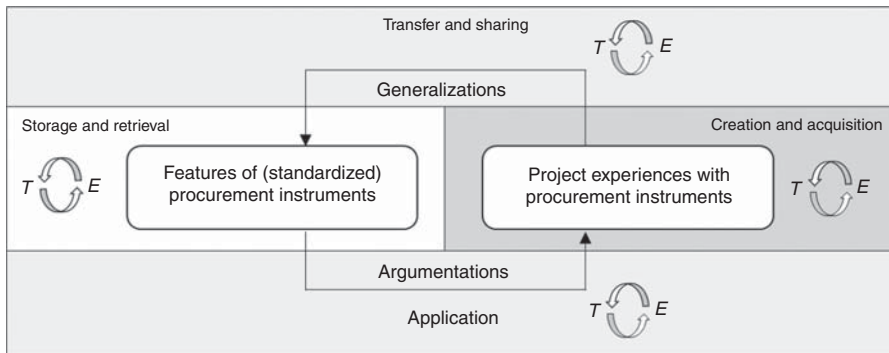
To illustrate how it is mapped, we refer to the examples mentioned in the previous section again. Imagine that the statement "D&C provides maximum ability for contractors to add value in design" is expressed in the selection process. In this process, procurement knowledge is applied to create a convincing argumentation for a procurement strategy. It thus concerns the knowledge application phase. The next phase concerns knowledge creation and acquisition. Knowledge may be acquired by comparing expected with empirical outcomes: Did D&C in this project indeed provide maximum ability for contractors to add value in the design? The acquired knowledge may be that D&C-contracts "[...] require greater commitment from us as a client to get what we want, as this is not predefined in a detailed design" (Eriksson, 2017, p. 220). This new knowledge may then be transferred from the situated to the organizational context through generalizations (the transfer and sharing phase), making it available for the final KM phase: storage and retrieval.

In all of these processes, it is likely that only part of the knowledge will be expressed or documented. As such, the tacit/explicit distinction is an indispensable element of the model (Polanyi, 1966). Whereas tacit knowledge in its extreme form cannot be articulated, other forms of tacit knowledge can be converted to explicit knowledge (Nonaka and von Krogh, 2009). Combination of the KM concepts with argumentation and generalization leads to the model depicted in Figure 2.

4. Model testing

To explore the model's potential value, it is tried out in the empirical context of a public sector client. Performing a case study seemed appropriate, since "a case study's unique strength is its ability to deal with a full variety of evidence – documents, artefacts, interviews and observations – beyond what might be available in a conventional historical study" (Yin, 2014, p. 12).

The model is tested for a single procurement instrument. The object of the case study is a qualification system (QS), a procurement instrument that has been in operation for many years by ProRail, the Netherlands state railway agency. This procurement instrument was selected for two reasons. First, it seemed appropriate for analyzing the reasoning process because at the start of the study, it was known that it had already been in use for a long time,



Notes: T, tacit; E, explicit

Figure 2.
Conceptual model of the reasoning process

and that some developments had been carried out over time. This suggests both some consistency in the reasoning for remaining in use, but also changes in the reasoning that explain the further development. Second, a number of officers with knowledge of the instrument and its history were still working for the agency. Given our aim to search for and convert potentially relevant implicit reasoning into explicit reasoning, this circumstance was recognized as a good opportunity.

A QS should not be confused with the tender stage in which contractors can prequalify for a particular project. The European Union's public procurement directives distinguish a specific group of public clients covering those "entities operating in the water, energy, transport and postal services sectors." The procurement activities of this group are regulated by "the Utilities Directive" (directive 2014/25/EU). Public clients in this group have the option of selecting possible contractors for a period of time and a certain scope of work, rather than having them requalify at every tendering procedure. This is called a "qualification system" (article 77, directive 2014/25/EU). According to the European Commission, QSS are suited to the procurement of technically exacting works, supplies or services that would otherwise involve lengthy qualification procedures (European Commission, 2011). The generally attributed advantages of this system are that it reduces costs and delays in procurement (Arrowsmith, 2003).

To show how the model is used, we briefly present the four research steps that have been executed.

Step 1: preparatory activities – the first step was to establish an overview of how the current QS evolved. Documentation on the QS was collected insofar as it could be retrieved from publicly available information and the client's internal archives. Using this information, the changes made to the QS over time were reconstructed. Next, given that the model focusses on the reasoning process, the documentation was closely searched for explicit statements related to motives, reasons or arguments, and descriptions of effects. These were then linked to the modifications to the QS over time.

Step 2: semi-structured interviews – the second step was to carry out semi-structured interviews with employees currently in service at the client. Interviews have been held with staff members perceived by the organization as the most knowledgeable on the QS because of their current or previous function. Amongst these interviewees were both the current and the previous manager responsible for the daily operation of the QS, and the employee who developed the first application of the QS and has remained influential in its later development.

The interviews had several goals. The first being to seek opinions on the reasons uncovered in Step 1: would the interviewees consider these reasons as adequately representing the previous and current purposes of the QS? If deemed inadequate, interviewees

are asked to explain their perceptions of the reasoning using a causal map. This approach was chosen for two reasons. First, we assumed that the assessment to touch upon the model's reference to tacit and explicit knowledge. In the KM literature, causal mapping by a group is proposed as a means for extracting tacit knowledge (Ambrosini and Bowman, 2001). Second, we anticipated the reasoning to address various elements and positions in a hierarchical chain of cause-and-effect relationships, and causal mapping facilitates thinking in such a hierarchy (Bryson *et al.*, 2004). The third purpose of the interviews was to determine whether the interviewees know of additional documents to those retrieved in step 1 that could explain the motivations behind the developments in the reconstructed QS evolution.

Step 3: sorting the collected information – the third step was to sort the collected information based on the model. The model is intended to help categorize the information by prompting questions such as:

- RQ1. Which motives, reasons or arguments are used to explain why the QS as it stands is in use and/or why it needs to be adjusted (argumentation)?
- RQ2. Which empirically observed effects have been attributed to the QS procurement instrument (generalization)?
- RQ3. Which of the answers given to these two questions are available in a documented form that colleagues could use in applying the QS (the concept of tacit/explicit knowledge and the codification strategy)?

Step 4: compare results over time – the fourth step was to compare the results of the previous steps with similar steps carried out after a period of one and a half year. By then, some persons involved in the operation of the QS had changed function. Again, causal maps are composed by staff members knowledgeable on the QS, which are then compared to the results of the previous steps.

5. Case results

For the purposes of this paper, the case results are presented by means of two concise tables. Table I illustrates how the QS has changed over time and which corresponding reasons were retrieved from documents. Table II illustrates the current reasons for operating the QS.

5.1 Evolution of the QS and the corresponding explicit reasoning

At the start of the research project, it was generally acknowledged within the client's procurement department that the QS approach had been in use for a considerable time. However, it was unclear why and when was it first applied, and how and why had it evolved ever since. Table I outlines the evolution of the QS as reconstructed by this study.

The reconstruction shows that the QS currently in use (QS2) has been in place for nearly twenty years. Further, while its structure has remained essentially the same, it has been changed several times, generally to expand its scope. However, the reasons for these changes, insofar as these could be retrieved from documents, did not quite seem to address the particular changes made. The documents uncovered tended to describe the change itself rather than why an adjustment was being made.

When asked about this, interviewees agreed that reasons for the adjustments were generally not that explicitly documented. Moreover, they argued that some knowledge of the historical context of the QS is necessary for a good understanding of its evolution. For instance, they explained that the expansion of the QS toward other market sectors was primarily driven by incidents on railway safety or reliability as these occurred over time. The QS seemed an appropriate tool to reduce such incidents. In addition, the context of the QS had changed over time as well. To illustrate this, some descriptions of the historical context are added to Table I (marked by "context").

Year	Context description and evolution of qualification system (QS)	Corresponding reasoning, as far as it could be retrieved from documents
1995	Context: splitting up of Dutch railways into an infrastructure manager, a train operating company and commercial firms. Few competitors for railway-specific projects	–
1995	Establishment of QS 1, for a large program on platform modifications	–
1996	Establishment of QS 2 for contractors in the rail branch	Increase in number of competitors (QS1 led to increase from 2 to 7 competitors); to control market entry; to reduce tendering costs
1997	Scope of QS 2 expanded to include engineering bureaus	Increase in competitors; to control market entry; to reduce tendering costs
1998	Scope of QS 2 expanded to include cabling contractors	Identical to reasoning in 1997
1998	Scope of QS 2 expanded to include workplace safety companies	Identical to reasoning in 1997
2001	Context: Report on procurement practices from 1995 to 2000 by Dutch Audit Court	Report concluded that the QS had contributed to an increase in competition
2003	Scope of QS 2 expanded to include maintenance contractors	Identical to reasoning in 1997
2005	Context: management concession granted to the client requiring environmental and safety management systems by January 2007 and January 2008, respectively	–
2006	Scope of QS2 expanded to include companies for securing that tracks are safely open for traffic	Identical to reasoning in 1997
2009	Scope of workplace safety companies within QS 2 expanded to include safety personnel agencies	Identical to reasoning in 1997
2013	Scope of QS2 reduced by removing companies for securing that tracks are safely open for traffic	–

Table I.
Evolution of the QS and the corresponding reasoning as retrieved from documents

Argumentation (purpose of QS)	Generalization (what QS does)	Observed empirical effect
(1) Compliancy with the safety and environmental requirements of the government's concession	The QS enables the client to comply with the safety and environmental requirements of the government's concession	The QS has been one of the main reasons for the auditor to conclude that client has been compliant
(2) Contribute to a safe and reliable rail infrastructure	The QS ensures that only firms that have mastered the required capabilities get to work on the core of the Dutch rail system	Instances where things went wrong prove that firms require knowledge of the uniqueness of the Dutch rail system
(3) Stimulate contractors to improve or gain additional competences in the future	The QS enables the client to stimulate contractors to further improve or gain additional competences	The market's adoption of Systems Engineering has been enabled by the qualification system
(4) Market entry to occur in a controlled manner ^a	The QS ensures that new contractors enter the client's market in a controlled manner	Newcomers have invested considerably in order to be able to demonstrate their competence
(5) Reduction in tender costs and duration ^a	The QS reduces tendering costs and time	Given the high demands and substantial paperwork, periodic qualifying has reduced costs and times considerably over qualifying for each tender
(6) Increasing number of competitors ^a	The QS increases the number of certified competitors	The number of certified competitors has increased in most branches, though it has remained limited in some

Table II.
Currently used argumentations, generalizations and the observed effects

Note: ^aReasons also identified in the documents

An anecdotal detail is that QS1 was only accidentally uncovered when an interviewee produced an old paper document that he thought might be interesting for the research. It dated from 1995 and came from his personal archive. This had preceded QS2 and has apparently disappeared from the collective memory of the interviewees. Interestingly, this document considered the pros and cons of establishing Qs. None of the retrieved documents related to QS2 included such considerations of the advantages and disadvantages. It appears therefore that QS1 has been successful in achieving an increase in the number of competitors and that this success became part of the reasoning for QS2.

5.2 Current reasoning for operating the QS

Table II outlines the reasoning for the current QS in terms of the conceptual model: argumentations, generalizations and empirically observed effects. Only those items that are positioned on roughly the same high hierarchical level of the causal maps are presented. Note that the ordering in the table is indicative of the relative importance attributed by the interviewees as a group. Individual interviewees have slightly different rankings. Reasons brought forward by interviewees that were also identified in the documents are marked by "ca".

Table II shows that the top three argumentations in favor of the QS, i.e. the ones most emphasized in the interviews, are not explicitly stated in any of the retrieved documents. Nevertheless, these were consistently perceived by the interviewees as the most important reasons for operating the current QS manifestation. When asked about the dominant implicit character of the reasoning, one interviewee suggested that the efficacy of the QS would rise if greater attention was given to communicating these argumentations: "If colleagues better understood the purposes of the QS, they would probably better inform us with early warnings that a firm might be decreasing in capabilities. That would enable us to anticipate, instead of reacting."

The comparison over time of the main reasons for using the QS yielded an ambiguous result. On the one hand, according to the individually filled out causal maps, there appeared significant diversity in the individual perceptions of the QS's main reasons. On the other hand, the top six main reasons remained the same, even after discussing the comparison with the results of one and a half years ago.

In conclusion, the QS clearly has evolved over time, mainly in the sense of expanding its scope toward other market sectors. As affirmed by the interviewees, changes to the QS are sparsely explained by documented reasons. Documented considerations of advantages and disadvantages of applying a QS date back to about 18 years ago. Moreover, for the current set of reasons for operating the QS, it strikes that explicitly documented reasons are sided by implicit, non-documented reasons, and that the latter are perceived by the interviewees as being the most important ones.

6. Discussion

In the first part of this paper, it was theorized that it is indeed worthwhile to examine the reasoning process as a process in its own right. The case study provides empirical material to reflect on this statement again, to discuss how modeling the reasoning process contributes to making sensible procurement choices, and to assess its potential contribution in the further development toward strategic procurement.

6.1 Reasoning as a process in its own right?

The case study results show that the top three reasons for applying the QS have emerged over time and have gained priority over the original reasons, yet have not been documented. The knowledge of these reasons remained at the level of few individuals. The emergence of these reasons seems to have been a non-organized, incident led process. Also, it appears that at least

the first and third of these top reasons have emerged independently from the use of the QS. The first reason concerns the compliancy with the safety and environmental requirements of the government's concession. These concession requirements were introduced only long after the QS was taken into use. Apparently, it was found that the QS has a relevant role in meeting these requirements. The third reason concerns the stimulation of contractors to improve performance. However, the adoption of Systems Engineering – an example brought forward to support this reason – was not envisioned originally.

Given this pattern of emerging reasons, it can be concluded that the reasoning process indeed should be regarded as a process in its own right. Although it may be triggered by the any of the four main processes, the results show that it can also occur independently of these. The general suggestion is that reasoning regarding any procurement system or instrument may change over time and thus change the set of previously used reasons. If these changes go unnoticed, the real value may become hidden or remain undetected, and perhaps also unexploited. It may even be worse, since changing reasons introduce the risk of inappropriate application of procurement options.

6.2 Does the model contribute to making sensible procurement choices?

The conceptual model is primarily based on the claim of KM literature that organizational knowledge can be managed (Alavi and Leidner, 2001). However, knowledge is an elusive concept. Therefore, to benefit from applying KM concepts and methods in a particular context, a first step concerns the identification of the type of knowledge that is to be managed. In this study, this is done by characterizing practitioners' knowledge in terms of generalizations and argumentations. The causal mapping method helps to put these in hierarchical order. The type of knowledge that is retrieved thus concerns a list of reasons that currently dominate the logic for applying the QS. This list provides valuable information for decision making on the continuation or further development of the procurement instrument. We conclude therefore that application of the conceptual model contributes to making sensible procurement choices.

Returning to the claim that organizational knowledge can be managed, we hold that the model also enables practitioners to examine and manage the reasoning process over time. It helps to avoid potential pitfalls, such as the possibility that one or more of the models' steps are skipped (e.g. to jump directly from argumentations to generalizations without examining empirical effects) or poorly taken (e.g. wrong interpretation of empirical effects, faulty generalizations, not taking over all relevant features).

In a similar way, literature also points at a theoretical consideration that supports the use of the model. Tsoukas and Vladimirov (2001) suggest that KM is the dynamic process of turning an unreflective practice into a reflective one. Practical mastery needs to be supplemented by a quasi-theoretical understanding. Applying their general argument to this particular context (Tsoukas and Vladimirov, 2001): practitioners may have (unreflectively) mastered certain procurement instruments, but if they need to teach new colleagues, or reflect on ways to improve the instrument, or get rid of likely confusions about the instrument, then they need to elucidate the use of the instrument by making explicit the reasons behind the instrument. In a similar way, literature has stressed the importance of reflection for learning (Bijleveld and Dorée, 2014; Schön, 1983). The model facilitates practitioners to do that.

6.3 Contribution to strategic procurement

The final aim of this paper is to assess the value of the study's results from the perspective of strategic procurement. In the private sector, procurement has long since been recognized as a strategically significant function that is capable of driving and delivering competitive advantage (Ellram and Carr, 1994; Úbeda *et al.*, 2015). While there are several differences between procurement in the private and the public sector (Arlbjørn and Freytag, 2012), in the

public sector, it is also increasingly recognized that public procurement can play a strategic role, not just in saving money, but in delivering broader government objectives (Zheng *et al.*, 2007).

Literature holds that several factors, including the level of involvement in strategic planning, the status, the knowledge and skills, and the level of integration of the procurement function are relevant for developing strategic procurement in an organization (Carr and Smeltzer, 1997; Cousins *et al.*, 2006). This development has been examined from the perspective of maturity models. More mature procurement functions spend more time on strategic activities, and use a higher number of tools and methodologies, and apply more complex strategies (Úbeda *et al.*, 2015).

Assessed from this perspective on strategic procurement, the value of this study primarily lies in the notion that the reasoning process can, and should be deliberately managed by the procurement function. It should be managed because it enables the procurement function to link the use and further development of procurement instruments with organizational strategy. To put it simply, while the conceptual model indicates how one can keep track of the reasoning behind procurement instruments, the strategic management theory explains as to why one should keep track of the reasoning. The following three points elaborate this position in more detail.

Public sector strategic management. Managing the reasoning process deliberately concerns the essence of performing strategic management. Bryson (2010, p. 256) describes public sector strategic management as “the appropriate and reasonable integration of strategic planning and implementation across an organization (or other entity) in an ongoing way to enhance the fulfilment of mission, meeting of mandates, continuous learning, and sustained creation of public value.” Strategic planning includes “clarifying organizational purposes and the requirements and likely strategies for success” (Bryson, 2010, p. 257). In terms of infrastructure procurement, these “likely strategies for success” are those that address the procurement of works, supplies and services. Since the reasoning process yields relevant input to decision making on the use of procurement instruments, explication of this reasoning contributes to the clarification of likely strategies for success.

Strategy formation. The reasoning process links to the topic of strategy formation. Five different meanings can be attached to the word strategy (“the five Ps for strategy”: plan, pattern, position, perspective and ploy) (Mintzberg *et al.*, 2009). Here we consider the “pattern” of strategies: strategies can be intended, deliberately carried out or emerge and, eventually, proven to have been realized or not. The case study shows that the set of reasons behind the use of the QS has become a mix of intended and emerged reasons. Given the priority attributed to the emerged reasons, the pattern of the reasoning for the QS over time primarily qualifies as an emerging strategy. The explication of these implicit, emerging reasons enables the client to return from partly implicit strategy formation to explicit strategy formulation again.

Strategic alignment. Literature indicates that creating strategic alignment is key to performance (Baier *et al.*, 2008; Gonzalez-Benito, 2007). While alignment may concern many aspects (Ateş *et al.*, 2018), it certainly concerns the fit between procurement instruments, procurement strategies and, ultimately, strategic goals. In the case study, the current fit between the QS and higher level strategies can be more properly assessed now that also the implicit reasons have been explicated.

6.4 Study limitations and future research

Clearly, there are several limitations to this exploratory study. First, the empirical part of this paper is based on the results of one case study only. Also, the case concerns only one procurement instrument that is used within the context of only one public sector client. More and different types of procurement instruments could reveal different patterns of reasoning than the one uncovered in our case study.

Second, since the conceptual model is only a first conceptualization, further research could develop and test more sophisticated models. While the model is based on a distinction between four core KM processes, literature also provides more detailed classifications. Next, the conversion of tacit to explicit knowledge received little examination in this study.

Third, different forms of research could be beneficial to further explore the reasoning process. Since it may concern a single practitioner's reasoning, but probably most often will concern reasoning in a group of practitioners, interactions between individuals may influence the outcome of the reasoning. Research methodologies such as critical discourse analysis could reveal such aspects of the reasoning process (Kwon *et al.*, 2014).

Directions for further research are therefore to investigate the reasoning process behind other procurement instruments, in other (public) client organizations, and to develop and test more sophisticated models for conceptualizing the reasoning process.

7. Conclusion

Procurement choices may have significant impact on an organization's performance and attainment of strategic objectives. Since procurement choices are influenced by the reasoning behind procurement instruments, it is key to manage the processes that produce such reasoning. This not only enables the procurement function to examine the quality of the reasoning that is brought forward, but also to deliberately align the use and further development of procurement instruments with organizational strategy. As such, deliberate management of the reasoning process contributes to making sensible procurement choices and is a relevant aspect in the development toward strategic procurement.

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Corresponding author

Hans Voordijk can be contacted at: j.t.voordijk@utwente.nl

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