ASSESSING QUALIFICATION SYSTEMS: THE RELEVANCE OF EXPLICATING IMPLICIT REASONING

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In public procurement, most contractors view the qualifying procedures they are obliged to follow as time consuming and wasteful. For one category of public clients, EU rules offer an alternative to qualifying for each project. Public clients operating in the water, energy, transport or telecommunications sectors may establish and operate a so-called 'qualification system'. This offers contractors the opportunity to qualify for a period of time rather than an individual project. The reasons for applying such a qualification system seem traditionally to be rooted in reducing transaction costs, particularly where the administrative demands are significant relative to the typical value of contracts. As such, it may seem self-evident that a client's choice between the two approaches should be based on cost efficiency considerations. However, cost efficiency may not be the only motive behind employing a qualification system. A case study is presented here that examines the evolution of such a system and the corresponding reasoning by its operator. While exploring the usability of a conceptual model for managing procurement knowledge, additional reasons for operating the qualification system are reconstructed by exposing the implicit organizational knowledge. Initial results show that formal reasons are combined with implicit ones. These implicit reasons are found to be key in explaining the current utilization of the qualification system. Over time, implicit reasons get included in the reasoning process and come to dominate the original formal reasons. Without proper explication of these reasons, the real value of the qualification system may remain undetected.
The contributions of this paper are twofold. First, it reports a case study in which the usability of a model developed for managing procurement knowledge is explored. Second, this paper offers a first insight into the evolution of a qualification system and the corresponding reasoning by its operator.

Keywords: implicit knowledge, public procurement, qualification system.

INTRODUCTION

Typically, public sector clients apply diverse systems, methods, means and tools to facilitate their procurement activities. Recognizing that procurement is an important means for achieving organizational goals, clients continuously strive to assess and improve the efficacy of such procurement instruments. Assessing and improving the efficacy of a procurement instrument requires adequate procurement knowledge. However, this may not be readily to hand, and may even have got lost to the organization if employees with relevant knowledge have left or simply forgotten important aspects over the course of time.

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The unavailability of adequate procurement knowledge may form an obstacle to assessing and improving processes. Assessing the efficacy of an instrument on the basis of inadequate knowledge will probably misrepresent the purposes of using the instrument, the context it is being used in, or the empirical effects of the instrument. As a consequence, adjustments made to the procurement instrument may be suboptimal. In the worst-case scenario, an assessment based on the wrong criteria may even lead to the decision to discard a reasonably effective instrument.

Our research has addressed two questions related to this matter. First, what kind of procurement knowledge is relevant when making decisions on continuing to use or further developing procurement instruments? Second, how can adequate knowledge be obtained during the daily practices of the client's organization? These questions are addressed using the theory and concepts of Knowledge Management (KM). First, a model is presented that has been developed for the specific purpose of identifying and managing the kind of procurement knowledge that is relevant to the context described above. Next, the model's practical usefulness is explored through a case study. The selected case concerns a form of procurement instrument that is generally known as a qualification system, here one that has been used for several years by a public sector client and which has been adjusted several times.

The contributions of this paper are twofold. It presents a model for managing the procurement knowledge that is developed in practice. Further, given that scientific literature on qualification systems is scarce, this paper offers an initial insight into the evolution of a qualification system and the corresponding reasoning by a public sector client.

MANAGING PROCUREMENT KNOWLEDGE: A KM MODEL

The first research phase has been aimed at developing a conceptual model that focusses on the kind of procurement knowledge that is relevant when making decisions on the further development of procurement instruments. Further, the model is aimed at facilitating use of that knowledge by applying theories and concepts from the literature on KM.

The model's approach to procurement knowledge

What kind of knowledge is relevant when deciding on the continued use or adjustment of procurement instruments? Since this issue is scarcely addressed in the literature, two a priori constructs are introduced to represent two specific categories of procurement knowledge: argumentation and generalization. These two terms are chosen as abstract representations for the two sorts of reasoning that may be encountered in a client organization.

Procurement instruments are used to achieve certain purposes. In recognition of this, the term argumentation is chosen to allude to all the articulated expectations or predictions about the empirical effects of a procurement instrument in a forthcoming application. For example, 'in this Design&Build project, the instrument will stimulate the innovative power of contractors tendering for the contract'. It is assumed that, later, such argumentations will form a relevant source of procurement knowledge since they represent expectations regarding the instrument's effects in a particular procurement process before it is actually used. The term generalization refers to generic statements about empirical effects that employees have actually observed in practice while applying a particular procurement instrument. From a KM perspective, this term 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). Examples of such statements are 'Design&Build improves the constructability of the design' and 'a negotiated procedure enhances the applicant's understanding of the client's vision of the project goals'. While such effects may have occurred in previous projects, these statements are formulated on a more generic level than experienced in those particular projects, and are probably used by more employees than only those who have observed them. The process leading up to such statements is assumed to be similar to the concept of theorization, which 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).

The term generalization is also used in the model to reflect the possibility that the statement may not necessarily hold true for all past applications of the procurement instrument. For example, Design&Build may not have improved the constructability in a particular project where the contractor's design team was not able to design well due to particular circumstances such as a temporary lack of design capacity or the lead engineer changing jobs. As such, the attribution of features may risk the fallacy of defective induction. However, the organization may well have experienced many more projects where the statement seems to correspond with the outcomes of the project, and thus they may hold the statement as generally true. Faulty or not, generalizations may subsequently serve as inputs to the set of features that are used by the client to characterize a type of procurement instrument. In turn, these features may serve as sources for argumentation to be used in future procurement decision-making processes, thus creating an iterative process.

In conclusion, argumentations and generalizations represent the kind of knowledge that is relevant when deciding to continue with and/or adjust procurement instruments because they select and express certain characteristics of procurement instruments abstracted from a complex reality.

Knowledge Management concepts in the model
How can theories and concepts from the KM literature facilitate the utilization of argumentations and generalizations? The very idea of KM implies that certain knowledge is present in an organization and, when managed in appropriate ways, the organization will benefit from that knowledge. One of the most widely used classifications of knowledge types is the distinction between tacit and explicit knowledge (Ragab and Arisha, 2013) that is based on Polanyi's concept of tacit knowing (1966). In essence, explicit knowledge is knowledge that can be codified and stored, whereas tacit knowledge cannot. Elaborating on this distinction, Nonaka and Takeuchi developed the SECI conversion model (Nonaka, 1995). In this model, tacit and explicit knowledge are considered the two ends of a continuum (Nonaka and von Krogh, 2009). This stance implies that while tacit knowledge in the strictest sense cannot be articulated, it may be possible to convert less tacit forms of knowledge into explicit knowledge. The SECI model argues that valuable tacit knowledge resides within individuals, and can only add value if it is converted into explicit knowledge. The concepts of tacit and explicit knowledge are applied in the model to account for the possibility that not all argumentations and generalizations occur in an explicit form in the organization.

The model also incorporates the four KM processes that are generally identified as part of the KM concept in order to position the iterative procurement knowledge

process described above in a KM perspective. Although various taxonomies have been proposed, the processes that should be incorporated in any KM system can be grouped within four core KM processes: creation and acquisition, storage and retrieval, transfer and sharing, and application (of knowledge) (Ragab and Arisha, 2013). At this stage of the research, these core processes are sufficient to create a conceptual model and explore its practical usability.

The KM literature can be categorized under several topics. One category concerns Knowledge Management Systems (KMSs), described as configurations of managerial, technical and organizational systems structured to support the implementation of KM within an organization (Massa and Testa, 2009). There have been three main approaches to KMSs: codification, personalization and people finder, plus a hybrid approach (Ragab and Arisha, 2013). Codification concerns documenting and storing knowledge in order to enable access to this knowledge by others and/or for future applications. This is a 'people-to-documents' strategy. In contrast, personalization concerns a 'person-to-person' strategy and focusses on the transfer of knowledge through face-to-face social interaction. The third strategy focusses on mapping the location of certain knowledge in the organization (the 'people finder' strategy). In our current research phase, only the codification strategy perspective is used.

Model for managing procurement knowledge
In the resulting model, the two a priori constructs are positioned against a KM background (Figure 1). This suggests that procurement knowledge should be analysed from the perspective of KM processes and knowledge conversion. The latter refers to the concepts of tacit knowledge (marked in the model as 'T') and explicit knowledge (marked 'E').
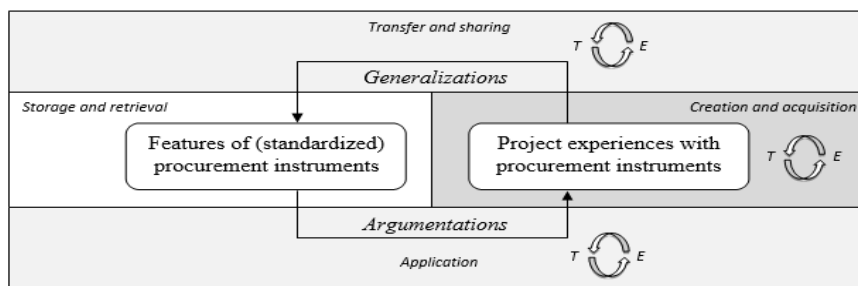

Figure 1: Model for managing procurement knowledge

Although this paper introduces the complete model, the focus is mainly on the a priori constructs and the concept of knowledge conversion. The other aspects of the model are beyond the scope of this paper.

RESEARCH METHOD

To explore the model's usability, the next phase in the research project involves applying the model in the empirical context of a public sector client. For this purpose, we selected a procurement instrument known as a 'qualification system'. Although the testing phase is not yet complete, the preliminary results are sufficiently interesting to report for two reasons. First, because they illustrate the kind of procurement knowledge that the model is directed at. Second, because the results offer insights into qualification systems, a procurement instrument scarcely addressed in the literature.

The object of the research and its empirical context
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 re-qualify at every tendering procedure. This is called a 'qualification system' (article 77, directive 2014/25/EU). According to the European Commission, qualification systems 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). The case study presented in this paper concerns a qualification system that has been operated for many years by ProRail, the Dutch state railway agency.

Research activities
To date, three research steps have been executed. These are now briefly described to illustrate how the model is used.

Step 1: preparatory activities
The first step was to establish an overview of how the current qualification system (QS) evolved. Documentation on the QS was collected insofar as it could be retrieved from publicly available information and 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 is to carry out semi-structured interviews with employees currently in service at ProRail. This step is ongoing. To date, interviews have been held with four 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 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 assume that the assessment will touch upon the model's reference to tacit and explicit knowledge and, in the KM literature, causal mapping by a group is proposed as a means for extracting tacit knowledge (Ambrosini and Bowman, 2001). Second, we anticipate 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. The third purpose of the interviews is 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 is to sort the collected information based on the model. The model is intended to help categorize the information by prompting questions such as:
1) 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)?

2) Which empirically observed effects have been attributed to the QS procurement instrument (generalization)?

3) 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)?

PRELIMINARY CASE RESULTS

The preliminary results obtained so far illustrate the type of procurement knowledge that the application of the model directs attention to. This is presented in order to subsequently discuss the usability of the model.

Evolution of the qualification system

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. Our questions were then, when was it first applied, and how and why had it evolved since? Table 1 outlines the evolution of the QS, providing an initial superficial answer to these questions.

Table 1: Evolution of the QS and the corresponding reasoning as retrieved from documents

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 programme on platform modifications.	-
1996	Establishment of QS 2 for contractors in the rail branch.	Increase in number of competitors (previous QS 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 ProRail requiring environmental and safety management systems by January 2007 and January 2008 respectively.	-
2006	Scope of QS2 expanded to include companies for securing safe railway passability.	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 safe railway passability.	-

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. This is maybe because the retrieved reasoning was identical for most of the changes: to increase the number of competitors for contracts; to control market entry; to reduce tendering costs. The documents uncovered tended to describe the change itself rather than why an adjustment was being made. When interviewees were asked about this, they 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. Consequently, descriptions of the historical context are added to Table 1 to illustrate the relevance of the changing context in which the QS has been applied.

An interesting 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 qualification systems. QS1 appears to have been successful in achieving an increase in the number of competitors and this has subsequently been behind some of the reasoning for QS2. None of the retrieved documents related to QS 2 included such considerations of the advantages and disadvantages.

Current argumentations and generalizations
The interviews were also intended to collect additional reasoning through appropriate questioning and causal mapping. Table 2 outlines the reasoning for the current QS in terms of the 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 as these are the most significant. Note that the ordering in the table is indicative of the relative importance attributed by the interviewees as a group. Reasons also identified in the documents are marked by an asterisk (*).

The table shows that the first three argumentations in favour of the QS, the ones most emphasized in the interviews, are not explicitly stated in any of the public and internal documents we uncovered. Nevertheless, they were consistently perceived by the interviewees as the most important reasons for operating the current QS manifestation. The interviews also gave another perspective on the relevance of this kind of knowledge. 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"*.

To summarize, the results show that the QS has been changed several times over the years. Although the original reasons for introducing the QS have remained important, the set of reasons has expanded. In this process, new reasons for operating the QS have become dominant. A factor in the additional reasons appears to be the changing context in which the QS is applied. The organizational knowledge of these additional

reasons is implicit in the sense that this knowledge is not documented. Therefore, the organization has to rely on employees that hold this particular knowledge.

Table 2: Currently used argumentations, generalizations and the observed effects

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 ProRail 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 ProRail 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 ProRail 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*.	The QS ensures that new contractors enter the ProRail 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*,	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*.	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.

DISCUSSION

The first question raised in this paper concerned the kind of procurement knowledge that might be considered relevant when making decisions on the continuation and further development of procurement instruments. Although the research is not yet complete, and the usability of the proposed model for managing procurement knowledge has only been investigated in a single case, we are able to offer some preliminary answers to this question.

The reasoning so far retrieved and explicated does arguably represent a relevant form of knowledge since a deliberate decision to continue with the QS approach requires a comparison with alternative instruments that might achieve the same results. One obvious alternative is qualifying on a tender-by-tender basis. Two of the three explicitly noted reasons for using a QS (more competitors, reduced tendering costs) would be a basis for making such a comparison. However, in this specific case, such an approach would risk overlooking the most important purposes in operating this QS since these are held as implicit knowledge. As such, it can be concluded that, alongside the explicit reasons, a proper explication of any additional implicit reasoning is important in coming to a deliberated decision to continue with the existing qualification system.

At this stage of the research, because the early results do not provide reasoning on a level that can explain the individual changes to the QS, we cannot be sure if this is

also true when it comes to the further development of procurement instruments. However, we anticipate the same approach in the next research phases, followed by an in-depth analysis, delivering results that address this aspect.

The second question raised concerned how to obtain adequate knowledge of the daily practices within the client organization. One option would be to simply go round and ask the people who are knowledgeable on the subject. Although this seems sound advice, how will we decide if, and when, the knowledge is adequate? Here, we need to consider the usability of the model. The first concern is that the implicit character of the knowledge introduces the potential for differences in the opinions of employees. It is possible that, over time, opinions will diverge, perhaps because there are effects that are interpreted differently. The model's goal of explicating the implicit reasoning should help in determining the adequacy of the knowledge collected. A second aspect concerns adequateness in the sense of correctness of reasoning. Some of the findings suggest that some of the argumentations for the QS are quite ambitious but it does not follow that they are borne out in practice. For example, the argumentation that there will be ' more competitors' contrasts with the empirical finding that 'the number of competitors has long been limited in some branches'. The model suggests an explanation for this by assuming that an iterative reasoning process takes place over time. In this process, the construction of generalizations helps in understanding where these argumentations may have originated and why expectations have been raised. Explicating and categorizing the reasoning, in terms of argumentations, generalizations and observed effects, enables one to assess its adequateness.

Clearly, there are still some limitations in the current exploration of the model. First, the results presented in this paper do not explicitly illustrate some aspects of the model, such as the four core KM processes or the tacit to explicit knowledge conversion. These aspects will be addressed in more detail in subsequent research phases. Second, the model has been only briefly explored with the qualification system, and not tested at all on other kinds of procurement instruments, nor with other public sector clients.

Finally, it is expected that future applications of the model would benefit from further elaboration of the argumentation and generalization constructs and their coherence with concepts and theories from the field of Knowledge Management that are referred to in the model.

CONCLUSIONS

The preliminary case-study results show how the qualification system, and the corresponding reasoning by the client, has evolved over time. It appears that, over time, the original formal reasons are compounded with implicit reasons. These implicit reasons were found to be the more important in explaining the current use of the qualification system. If these reasons are not properly explicated, the real value of the qualification system may remain undetected. Further, the model presented in this paper offers a framework for reconstructing the reasoning process in an organization, thereby enabling the value of its qualification system to be assessed.

The model's reference to Knowledge Management concepts and theories will be addressed more explicitly in next research activities. It is expected that a further elaboration of the argumentation and generalization constructs and their coherence with concepts and theories from the field of Knowledge Management will help to further advance the model's usability for managing procurement knowledge.

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