Public Procurement of Innovation as Endogenous

Exogenous Knowledge Conversion.

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Public Procurement of Innovation as Endogenous - Exogenous Knowledge Conversion

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Abstract

Public procurement used as an innovation policy instrument has attracted attention the last decade. It has been argued that public procurement can be used to stimulate innovation from the demand-side. This paper problematizes 'demand' understood as a problem defined by a public procurer given to potential suppliers to solve. By drawing on a cross-case analysis of two similar projects the paper attempts to explicate an understanding of the role of public procurement of innovation not primarily as a 'demand-side innovation instrument', as such thinking might run the risk of ignoring important underlying mechanisms critical for success. Instead the paper views public procurement of innovation as an instrument of endogenous-exogenous knowledge conversion.

Keywords: Public procurement, innovation, knowledge conversion

Submission category: competitive paper

Introduction

Apart from a sourcing mechanism evoked to directly secure the delivery of public services public procurement may be used to achieve certain social outcomes (McRudden, 2004). Secondary effects of public procurement may be e.g. market creation (Caldwell et al, 2005); the promotion of sustainable technologies (Walker et al, 2012); decreasing climate impacts (Nissinen et al., 2012); or facilitating adoption of innovative technologies emerging elsewhere (Phillips et al, 2007). This paper attempts to contribute with knowledge regarding the role of public procurement as a means to stimulate innovation (Edler and Georghiou, 2007; Rolfstam, 2009; Uyarra and Flanagan, 2010), a topic that has attracted attention from policy makers (e.g. European Commission, 2010; OECD, 2011). The underlying idea is that public demand for innovative goods and services can stimulate firms' commitment to innovation and thereby gain competitive advantages in a global economy. It appears however as the policy development aiming at promoting public procurement as a demand-side innovation policy instrument has not materialized into concrete action to the extent envisaged by policy makers. The official view is still that "Europe has an enormous and *overlooked opportunity* to spur innovation using procurement" (European Commission, 2011, p. 16, italics added). Also practitioners note that "public procurement of innovation is hardly ever used in a strategic way" (van Putten, 2012).

The perceived underutilisation has rendered debates concerning how to fully exploit the potential in public procurement of innovation. Arguments have been brought forward concerning claimed innovation-inhibiting effects in the legislative framework (for the EU, the EC Directives on Public Procurement) (Edquist et al., 2000; an assumption falsified in empirical research (Rolfstam, 2007; 2012a). The issue of risk associated with innovation has also been brought up (Aho et al 2006; Tsipouri et al. 2010). Scholars have also underscored

the need for allocation of different aspects of management skills for successful public procurement of innovation (Rolfstam, 2007; Uyarra and Flanagan 2010; Yeow and Edler, 2012). A common nominator for these debates is that problems and solutions are sought after by scrutinizing public actors only. With the understanding of public procurement of innovation as a process that includes one or more public agencies that works together with one or more suppliers and/or other organisations, it is noteworthy that very little attention has been given to potentially important factors residing outside the public side of the story, for instance the role of suppliers and the institutional context in which a particular public procurement of innovation-project takes place. The current paper attempts to help filling this void by drawing on institutional theory and theories on knowledge conversion.

Institutional theory and knowledge conversion

With the increasing interest for this topic have emerged different notions, innovation procurement, public technology procurement, innovative procurement, etc., all with slightly varying definitions. The generic notion applied here is public procurement of innovation understood as "*purchasing activities carried out by public agencies that lead to innovation"* (Rolfstam, 2012b, p. 1). The advantage with this definition is that it takes into account all kinds of activities that may take place as pre-cursors or in the aftermath of a specific procurement process i.e. activities in the commissioning cycle and the procurement cycle (Murray, 2009), including also activities leading to awareness of possibilities and threats in the external world. It opens up for an understanding of public procurement of innovation as a continuous process within a public agency. This is somewhat different from definitions that might have been more widely diffused. One example is the old definition of technology procurement understood to occur "when a public agency acts to purchase, or place an order for, a product – service, good, or system – that does not yet exist, but which could (probably) be developed within a reasonable period of time, based on additional or new innovative work by the organisation(s) undertaking to produce, supply, and sell the product being purchased" (Edquist and Hommen, 2000, p. 5). Even if public demand can manifest also as long-term signalling, labelling or regulation (Gregersen, 1992; Geroski, 1990; Rothwell, 1984) this definition has helped to reduce public procurement of innovation to mainly concern "procurer competence" and specification. Public procurement of innovation becomes in this light a project-level command-tool, where potential suppliers are asked to solve a certain problem where success is mainly determined by management and organisation-specific decisions, a view that "largely ignores the contributions of institutional approaches (Coriat and Weinstein, 2002, p. 274). The current paper attempts to variegate what these authors (ibid) consider an overemphasis on organisation-specific decisions by adding a holistic analytic layer drawing on institutional theory. This is an endeavour essentially set out to delimit the role of 'management'. The assertion promoted is that although e.g. procurer competence and specifications are examples of important demand-side factors for success in public procurement of innovation, the readiness of potential suppliers and the institutional context in which a procurement project occurs are as important factors for successful outcomes of public procurement of innovation.

Rolfstam (2012) develops a theoretical framework for understanding public procurement of innovation that draws on institutional theory. This framework treats innovation as a special case of human collaboration and as such governed, supported, affected and/ or regulated by institutions understood as at least effectually collectively agreed on ex ante structures. The framework considers institutions as prevailing on different levels which enables the distinction between exogenous and endogenous institutions (Jacoby, 1990). Exogenous

institutions are many times formal and based on and enforced by authority. Endogenous institutions are more often informal rules that individual agents decide to give themselves which evolve within an institutional set-up. Institutions can also be considered as rationalities (Van de Donk and Snellen, 1989, or selection mechanisms determining learning for a particular institutional context (Vanberg, 1997; Argyris, 1994) and the creation of organisation and/or context-specific routines (Nelson and Winter, 1982). In other words, for an economic entity working under scarce resources its rationality will determine if it develops specialised skills useful for, let's say fire-fighting instead of investment in bio-tech start-up firms. These mechanisms evolve also on institutional levels such as regions or nations. Regions for example, are "often defined in terms of shared normative interests (culture areas), economic specificity (mono-industrial economies) and administrative homogeneity (governance areas)" (Cooke, 1998, p. 15). Sometimes this mechanism can be seen as developed based on natural assets in a given region, for instance a natural harbour that leads to development of shipping, shipbuilding, and other related maritime industries. The generic point to make is that innovation is not a rational process that builds on free knowledge available for anyone to apply. Rather, innovation occurs based on institutionalised path-dependent rationalities as prevailing in specific contexts that match with each other.

Similarly, although with a completely different starting point, argues Nonaka (1994, p. 14), that "innovation"…"cannot be explained sufficiently in terms of information processing or problem solving. Rather, innovation can be understood as a process in which the organization creates and defines problems and then actively develops new knowledge to solve them". Nonaka describes knowledge creation as interactive processes that take place in two dimensions, the ontological dimension and the epistemological. The ontological dimension refers to the interaction between individuals, groups, organisations and interorganisational interaction. The epistemological dimension refers to the interaction between tacit knowledge and explicit knowledge. Organisational knowledge leading to innovation is created from an initial idea gradually allowed to transform between tacit and explicit modes and evolve through-out and across organisations. The knowledge creation process is however not free, but is exposed to judgements prevailing within the organisation. Apart from rational business considerations the "truth-fullness" of new knowledge is determined by "opinions about such things as the extent to which the knowledge created is consistent with the organization's vision and perceptions relating to adventure, romanticism, and aesthetics" (Nonaka, 1994, p. 26), i.e. in institutional terms, the endogenous institutional set-up of a particular organisation and/ or context.

Let us then assume a procurement process as formal and exogenous, in relation to the supply side and the context in which it occurs. Applying the Nonaka model in combination with the institutional framework outlined above, paves the way for the understanding of success in public procurement of innovation as depending on an institutional match between the exogenous demand defined, and the endogenous institutions prevailing among suppliers and other stakeholders. A tender call must somehow align with endogenous "opinions about things" in order to become successful. In that light becomes public procurement of innovation a way of facilitating endogenous knowledge conversion (fig 1).

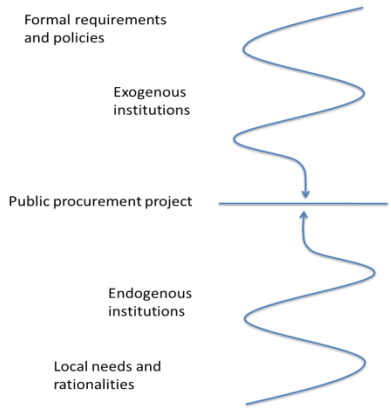

Fig. 1. Public procurement of innovation as facilitation of endogenous knowledge conversion.

This perspective provides an alternative understanding of the formal public procurement processes. Rather than being an act of 'demand as in command" or a matter of problem solving, it becomes instead an interface where alignment with different institutional levels and rationalities becomes a central issue. This assertion and its implications are investigated in a cross-case analysis of two public procurement of innovation projects, as described below.

Method

The paper draws on two cases of public procurement set out to render innovation. Evidence drawn on was gathered through reviews of documentation, archival records, face-to-face interviews, telephone interviews and e-mail communication with stakeholders (Yin, 1994). Two relatively similar cases with diverging outcomes render obviously interesting opportunities for comparison. By comparing a researcher may be able to reject competing explanatory variables (Ragin, 1987, p. 38). For a single-case analysis one might draw conclusions based on identified phenomena caused by certain stimuli. A cross-case analysis might strengthen the initial conclusion if the same phenomenon occurs caused by the same stimuli also in the other case. On the other hand - if a certain phenomenon is caused by the presence of a certain stimuli, this does not imply a causal dependence if the same phenomenon occurs in another context without the stimuli being present. That is at least the general advantage with comparing two cases with each other.

Two cases of public procurement of innovation

Discussed here are one case that evolved in Bracknell Forrest, UK, "the Woodchip case" and a case that evolved in Sweden, "the Bio-fuel case". The Wood-chip case concerned the English town Bracknell Forrest that initiated a project with the intention to build a sustainable power plant running on wood-chip (Rolfstam, 2012a). This was a sub-project in a rather substantive re-generation of the town-centre threatened by economic decline. The wood-chip-fuelled power plant was intended to deliver sustainable energy to the renewed part of the town centre. The basic reason why the project failed was that the project did not manage to negotiate the differences between rationalities and organisation-specific institutional set-ups among the stakeholders. The project would have led to different types of innovation, had it eventually been finalized. However, as things developed the procurers eventually came to a stage where there were no suppliers interested in submitting a bid and the procurers had to terminate the project without rewarding the contract.

The Bio-fuel case concerned the public procurement project that led to the development and finalization of what at the time was a state of the art facility in Sweden, the Biogas and Upgrading Plant in the Swedish town Västerås (Rolfstam, 2010). This case evolved in the context of the Agropti-project funded by the European Commission, which was a demonstration project for these kinds of technologies. The outcome of the project, the energy system came in operation in 2005 as the result of a process beginning some fifteen years earlier when local farmers began to consider abandoning increasingly less profitable food production and instead turn into production of green energy. The Biogas and Upgrading Plant was built to produce bio energy from organic waste generated by citizens in the region, ley crop grown by local farmers and grease trap removal sludge from restaurants and institutional kitchens in the area. The bio fuel that came out of the process would be used in buses in the region, waste collection vehicles and cars. Biogas that was not upgraded to fuel quality was used for production of electricity and heat. The residuals remaining in this process were used as high quality fertilizers by local farmers.

A comparison of the two cases reveals at least the following. Both projects intended to achieve some kind of sustainable energy solution. Both projects also envisaged the creation of local supply-markets. In the Bio-fuel case, a market for ley-crop was initiated. In the Wood-chip case, the energy production would have relied on local supply of energy wood. The level of innovation the two projects had in mind appears also to be similar. In both cases the envisaged systems would have manifested state-of-the-art technology in the respective countries. Some elements appear in both cases, but were implemented in different ways, as discussed in the following sections.

Multiple rationalities in public procurement of innovation

Both projects consisted of an array of different organisations that each had a stake in the process. In the Bio-fuel case several public agencies and NGO's were involved: VAFAB miljö, a public environment (waste handling) company in turned owned jointly by the municipalities in Västmanlands County and two other municipalities; Mälarenergi AB, a public utility owned by Västerås municipality; Lantbrukarnas Ekonomi AB a company owned by The Federation of Swedish Farmers (LRF) and; Odlargruppen, an association gathering of local farmers who later would become the supplier of ley crop and buyer of fertilisers. In the Wood-chip case, stakeholders in the project were, apart from the Bracknell Forest Borough Council also the political leadership of the town; the Bracknell Forest Regeneration Partnership (BRP), a joint venture consisting of the major local land-owners; the Thames Valley Energy (TV Energy), an organisation devoted to the promotion of green energy; two EU funded energy development projects aiming at promoting and diffuse new knowledge on green technologies; and potential suppliers.

Organising Rationality Representation

In the Bio-fuel case, stakeholders that would become future users of the final system were included already from the beginning while the procurement side in the Wood-chip case consisted essentially of all rationalities apart from future users. In the Bio-fuel case, the future operator of the facility, Växtkraft AB carried out the procurement project. Indirectly included as co-owners of Växtkraft AB, were also stakeholders that would be a part of the system once in operation. One example are the farmer members of Odlargruppen, interested in finding a market that would enable a shift from growing food to instead growing crops that could be

used for energy production. The Wood-chip case, on the other hand, evolved as a catalytic - and in a way also a distributed procurement process where the role of the public procurers at Bracknell Forrest was to facilitate the process, not to operate the power plant. Instead, the builder and future operator was to be allocated through the procurement process. In the Wood-chip case the procurer-side included rationalities that where relevant for promotion of secondary rationalities that would not have a direct operative interest in the power plant once it was built. TV Energy and the BRP for instance, represented primarily other rationalities; in the case of the TV Energy the promotion of sustainable technology in general and in the case of BRP, the ambition to build a new town centre.

The observation that the rationalities of the future operations was included on the procurer-side in the Bio-fuel case but excluded in the Wood-chip case is noteworthy. In the Bio-fuel case, any critical requirement from the future operator could be integrated into the project already from the beginning. As will be discussed further below, several other issues related to the operations of the future power plant were also dealt with before the actual tender call was published. One example of such foresight was the securing of commitments by certain target groups on which the future operation would rely on. In the Wood-chip case, such operator access would have been established only after identification of the supplier/ operator, i.e. after the contract had been awarded. This means that the whole pre-procurement phase where the project was defined lacked a stakeholder that would advocate the operator's rationality.

Interaction for innovation

Both the cases included interaction with different stakeholders such as public agencies, suppliers, and other forms of organisations. The problem as revealed in the two cases is that establishing what actors belong to the procurer side and to the supplier side is not a completely straightforward task to do – at least not if one assumes the sides to be distinct from each other. As we saw in the Bio-fuel case, the farmers as represented by Odlargruppen, were part of the procurer-side as members of the Växtkraft board, in the same time as they were also a part of the future solution; they were becoming the future suppliers of ley-crop as well as customers paying for the fertilizers. In the sense that the whole project emerged as a response to the strive towards developing an alternative to conventional farming, one could say that the farmers provided demand as well as parts of the supply, if not to the construction, so at least to the operation of the innovation to be built. In the Wood-chip case, the starting point for the whole project was the perceived need for a completely new town centre in order to sustain economic growth. In addition there was also pressure from paradigmatic and political rationalities emphasising sustainable energy. The procurers at the local council facilitated in that sense a procurement process driven by demand from others.

Interaction with the external environment

Another difference revealed in the comparison between the cases concerns interaction with the external environment. This was especially immanent in the Bio-fuel case where procurers extended their interaction to include also stakeholders not directly involved in the contract. Over the years several different meetings where held with organisation and groups that could affect or be affected by the project. The procurers interacted with environmental authorities, city planning authorities, The Swedish food industry, the KRAV (environmental labelling) organisation, voluntary environmental organisations, public consumer organisations and the Swedish Association of Waste Management. The way stakeholders (other than the procurer and the suppliers) were utilized was not only in terms of discussions or sharing of

information. An array of these external stakeholders played a concrete role in relation to the risk management and the decision to actually go ahead with the project. It appears that this interaction with external bodies was significant for the success of the project. Without the consent of these stakeholders, the project would not have been able to proceed. Long-term agreements with local farmers were set-up to assure sufficient supply of ley crop to be used by the bio-plant. Long-term agreements with local bus company for buying bio-fuel were set-up to guarantee a supply marked for the product, bio fuel. Required legal documents, e.g. related to environmental laws had to be in place. Before commencing with the project, the procurers sustained approving document from food industry verifying that the fertilizers that would come out of the system could be used for food production. People who lived near the location for the planned system were also consulted.

Also in the Wood-chip case, different organisations were allowed to influence the project. There were however some stakeholders that were not included in the Wood-chip case that were included in the Bio-fuel case. As the buildings in the new town centre were yet to be built there were no tenants available. Any ambition to interact with future tenants in the pre-procurement phase was therefore impossible. The situation was the same for interaction with the supplier and future operator and any stakeholders that the supplier and future operator would consider important to include. Such supplier- stakeholder interaction could essentially take place only when the operator had won the contract, i.e. when the supplier would know it would build the energy centre. The problem was that the commitments ideally coming from such interactions would be required to establish the commercial feasibility of the project, which was a requirement for being able to place a bid in the first place. Without them, the suppliers were not prepared to take the risk. In this sense did the project in its own 'absolute simplicity' create its own institutional barriers that reduced the possibilities for interaction (Heller, 1994). Thus, there is an institutional explanation to why this interaction did not take place in the Woodchip case - the institutional set-up of the project did not allow it.

The role of specifications

The way specifications were used varied between the two projects. In the Bio-fuel case, the tender call was set-up following the principles of performance-based procurement (PBP) (Wade and Björkman, 2004). In practice this meant that the procurers defined how much bio-gas the intended system should be able to deliver, not specifically how that should be achieved, leaving to the supplier to figure out how the function should be implemented. In the Wood-chip case the winner of the contract was supposed to build and operate the power plant. What was different from the Bio-fuel case was the rather explicit demand for renewable technologies which worked to restrict such freedom of action and also therefore to reduce the variety among bidders. In retrospect one could argue that formulating a specification that would have encouraged innovative solutions while still allowing more conventional solutions might have been a better option as this might have allowed bids based on conventional technologies to be submitted.

Another aspect of specification concerned the configuration of the bidding side. Here the two projects applied two different approaches. In the Bio-fuel case, the finalisation of the complete system relied on several different suppliers where each supplied a component of the system. In the Wood-chip case smaller firms and firms that could not document technological experience on the scale corresponding to the intended system were excluded. The tender call in the Wood-chip case was also set-up with a financial requirement. As the future ESCO would have to be able to finance the project, the procurers assumed that this would imply a

rather large firm. In the Bio-fuel case, the size of the supplying firms was not an issue. The contracts awarded included on the other hand only construction of the facility, not future operations. A specific requirement of size did nevertheless neglect the possibility for an ESCO formed by a consortium of smaller firms in the Wood-chip case.

Diffusion of information

Both projects were exposed to the demand to diffuse information of the projects to others. Although other factors were more central for the outcomes of these projects, this particular requirement still affected the projects in different ways and the analysis of its role also reveals some institutional phenomena. In both cases the demand for knowledge diffusion essentially came with the EU funding both projects were benefiting from. One difference between the cases was how this requirement where perceived among different actors. The stakeholders in the Bio-fuel case appear to have complied with this requirement rather well. There was, for instance, a website set-up displaying all kinds of information on the project. One of the project partners was also assigned to diffuse information about the project to Eastern European countries (Bengtsson et al., 2006). Information about the project has also been diffused through production and distribution of booklets and through participation in an array of events, presentations, workshops etc.

Although one could argue that the Wood-chip case did not reach a point where similar actions would make sense, it is still noteworthy that the perception of the knowledge diffusion requirement was not particularly sympathetic among some of the stakeholders. There is also an institutional explanation for this difference. In the Bio-fuel case, many of the information diffusion activities were laid upon the public procurer. In the Wood-chip case, the suppliers and future operators of the energy centre were supposed to play a larger role. The suppliers did not appreciate this assignment which in turn reflects the difference between political and paradigmatic rationalities of public actors and private firms. The suppliers put more emphasis on the technical and economic aspects of building and operating the energy-centre and less emphasis on the political rationalities associated with knowledge diffusion. This appears also to be the case with the suppliers in the Bio-fuel case. As far as this study goes, the suppliers did not play an important role in diffusion information about the project. The procurer in the Bio-fuel case, acting on behalf of an array of public agencies, was more appreciative to such political rationalities. So, although both projects identified the builder/operator as a central agent for knowledge diffusion, the difference was that in the Bio-fuel case this concerned a public agency, while in the Wood-chip case, a private firm operating under commercial rationalities.

Public commitment…

In the Bio-fuel case the procurer essentially performed an intrinsic procurement offering a contract to the supplier offering the best solution to the specified problem. This commitment meant that the builders of the different parts of the power plant could engage in their development work with the expectation to get duly rewarded for their efforts. As was described above the procurer also secured an array of commitments from other stakeholders. These secondary commitments were important not primarily for the builders of the power-plant, but for the future operator, i.e. in this case for the procurer itself. Examples of this kind of institutional commitment was the clearance from the food industry to use the fertilizers that would come out of the system for food production and the acceptance from households to adjust their waste handling routines. Thus, one point to make here is that it was the procurer,

acting as the future operator that took on the role of establishing these commitments. A second point is that they undertook all these arrangements before the tender call was published. The project would then be relatively secured from encountering problems stemming from the external world. The set-up in the Wood-chip case was different. The contractual arrangements required the bidder and future operator to agree to form an Energy Service Company, i.e. not only design and bid, but also commercially operate the power plant without knowing whether any commitments from other institutional actors could ever be achieved.

On the general level were the future/ potential operators in both cases exposed to the same challenges the cases differed in terms of the ability for problem owners to deal with them. A primary reason for the lack of commitment in the Wood-chip case, as was mentioned above, was that some of these institutional actors did not exist at the time for the procurement project. One suggestion brought forward was that the local council - a fairly significant future tenant in the renewed town centre, could have, if it had wished to make such a commitment - worked as a leaver to create the initial market required for the renewable energy centre. The position held by the local council was however, based on their interpretation of the procurement law. The argument made was that such advance commitment could not be done because it might jeopardize the requirement to secure best value for money at all times. The other possibility, as was seen in the Bio-fuel case, would be to make the future operator facilitate the establishment of such commitments. Given the set-up of the project, this would however have required suppliers willing to engage in rather demanding pre-procurement activities without knowing whether or not they would eventually win the contract. Thus, even if all potential institutional actors had been available and willing to participate, the expectations of any such pre-procurement activities appear to be rather unrealistic.

… as Risk management

The importance of taking early measures to deal with risk in public procurement of innovation is acknowledged in the literature (Aho et al, 2006; Tsipouri et al., 2010). The notion of early supplier involvement underscores the importance of interaction early in the design cycle as a way of managing and minimizing risk. "With better exchange of information comes knowledge of the situations surrounding the dynamics of a supply relationship, and with that knowledge comes greater potential for detecting, averting, and managing supply risk (Zsidisin and Smith, 2005, p. 51). What is further interesting is that "potential for product failure is minimized by problem prevention rather than through remediation" (Zsidisin and Smith, 2005, p. 54). Early supplier involvement in the context of public procurement has also been discussed (van Valkenburg and Nagelkerke, 2006). The way the project was designed in the Bio-fuel case gave the procurers the possibility to take such early measures. Making agreements with other institutional stakeholders is also example of preventing problems that would potentially emerge once the operations were commenced. The project set-up in the Wood-chip case left much of the risk management to the suppliers and future operators of the power-plant. This might not in itself be a problem as long as the bidder can add cost associated with risk to the price offered. In this case, however, as the revenues were to be collected through the future operations, the situation was different than in the Bio-fuel case, where the bidders were guaranteed a certain price as agreed with the procurer. The bidders in the Wood-chip case were thus left to consider the market risks themselves. Again, any ambitions to take early measures such as establishing commitments were also reduced for the suppliers partly because of the contract design, but also due to the fact that the future customers were not available at the pre-procurement stage.

What are the Management implications?

A preliminary attempt to derive some management implications from the cases renders a list of observations. It underscores the importance of setting up a project organisation where all relevant rationalities are included. It furthermore stresses the importance of interacting with and establishing early commitments with stakeholders that might affect the success of the future operations, which is also something stressed in the risk management literature. There are also lessons to be learned concerning specification and exclusion criteria in tender calls – in particular the importance of considering the difference between desired goals and requirements. Even if the ambition may be high, it might be sound to design tender calls in such a way that less ideal bids are still allowed as a second-best option might still be better than no option. However, the cross-case analysis renders another point that concerns the procurement processes and the relation to their respective endogenous contexts which somewhat reduces the validity of the management implications derived. A contra-factual discussion in the following section develops this point further.

Effective and efficient public procurement of innovation

One could ask what had happened if the Wood-chip case had followed a similar approach to stakeholder interaction as was applied in the Bio-fuel case. It would be tempting to suggest that the procurers in the Bio-fuel case emphasised much more the interaction between different stakeholders and became therefore more successful than its British colleagues in realising their demand for sustainable energy. To assume that interaction always lead to successful outcomes of public procurement of innovation projects is however problematic. Such a claim ignores that different institutional levels and rationalities may not be easily changed merely by interacting. One side-story in the Bio-fuel case provides a case in point. The Bio-fuel case also involved an attempt to build a power plant that was never realised. Building the bio-gas facility in Västerås was actually just a solution to a critical problem that emerged in the Agroptigas project, namely that Växjö, another Swedish town situated some 450 kilometres south from Västerås that initially was intended to host the new facility stepped down from the project. These developments captured by Bengtsson et al. (2006) are summarised in the following.

Around year 2000, Växjö worked together with two neighbour towns, Alvesta and Ljungby to develop routines and technology for waste handling and recycling of bio-waste. These towns with Växjö as the leading partner got funding to build a facility similar to the one eventually built in Västerås. The plan emerging from the agropti-project was to have the bio-waste fermentation facility in Växjö and then burn non-biological waste in a facility in Ljungby. There emerged however different uncertainties that came to completely alter these initial intentions. A common waste-handling method in Sweden at the time was simply to burn the waste without separation of bio-waste. This was also the principle followed by the waste-handling facility operated by the town of Ljungby. Pressure from the EU prompted however for removal of fossil-based fuels. Many operators feared that they would be forced to adopt to waste handling systems where separation of bio-waste was carried out. After intense lobbying from Swedish towns and waste management authorities, Swedish environmental authorities eventually interpreted the message from the EU level in such a way that it made it possible for Ljungby to commence with operations without separation of bio-waste. To Ljungby would sending the bio-waste to Växjö instead of burning it at their own facility also mean a reduction of half of their revenue. The result of these developments was that Ljungby

withdraw from the project. This situation prompted a search process that eventually led to the localization of the bio-fuel facility in Västerås. There were also other telltales of the problematic situation that led to the change of localisation of the facility. There prevailed local political disagreement about the project. There were also doubts concerning the economic viability. The support from local farmers was also at least initially ambivalent. Being an area with large forests and the fact that the Ljungby facility were already relying on wood-chip as one of the fuels used for operations are further indicators of the institutional mismatch between the project and the endogenous institutional set-up. The Ljungby situation was rather different than in the Bio-fuel case where farmers for many years had worked with the idea of finding alternatives to food production. Another difference between the two Swedish cases pinpointed by Bengtsson et al. (2006) concerned the fundamental rationalities behind the projects. The work in Västerås was much more driven by a belief in the necessity for adjusting to sustainable technologies while decision making among the southern Swedish colleagues were mostly affected by economical rationalities.

The issues that emerged in Ljungby are to some extent similar to the situation in the Wood-chip case. In both cases doubts prevailed concerning the economic viability. Both cases also suffered from a lack of stakeholder alignment. It could be argued that both the Ljungby case and the Wood-chip case were initiated by exogenous rationalities that did not fully match with the respective endogenous institutional setup prevailing in the context in which the intended innovations were to be introduced. For Ljungby exogenouity came with the Agropti project and the emphasis on bio-fuel which contrasted against economic endogenous rationalities and their tradition as a forest region. The exogenous starting point for the Wood-chip case was private landowners' initiatives to defeat town centre decline as well as exogenous pressure for sustainable technology. In the sense that end-consumers were not identifiable an essential part of the endogenous set-up where missing at time of the tender process. The supply-market for wood-chip appears also to have been rather underdeveloped in comparison to the Bio-fuel case, where ley-crop producers where part of the procurer side. The Ljungby case and the Wood-chip cases are therefore interesting as they help to qualify the understanding of the virtues of the different measures and steps taken by the procurers in the Bio-fuel case. Even if the whole spectrum of measures to interact and establish commitments from stakeholders that was taken in the Bio-fuel case, had been set in motion in the Wood-chip case, this might not have changed the final outcome anyway.

This gives reasons to re-evaluate the importance of the interaction. For local farmers in the Bio-fuel case growing ley crop to be used for bio-fuel production would make out an alternative source of income. The realisation of the bio-fuel plant was in that sense the manifestation of ideas discussed under many years before the actual procurement project was initiated. From that perspective was the formal tender call more the crowning of an endogenous process undergoing for many years than the origin of the demand itself. This also casts new light on the interaction that underwent between endogenous stakeholders in the project. If seen as a project manifesting endogenously evolved demand, the institutional change required among actors to achieve an institutional match may have been relatively small. The interaction the procurers facilitated in the context of the tender process changed perhaps not so much the fundamental rationalities already prevailing among actors as it made already endogenous institutions exogenous through formal agreements. It is in that sense possible to talk about efficient versus effective public procurement of innovation, i.e. the difference between doing the right things and doing things right. One could argue that among the success factors the procurers in the Bio-fuel case could enjoy was also the fact that they were doing the right thing in relation to the endogenous institutional set-up. One reason for

the problems in the Wood-chip case was that the project attempted to do the wrong thing in relation to the endogenous institutional set-up.

Public procurement of innovation as knowledge conversion

The typical contribution of institutional theory in relation to interaction is the focus set on the role of institutions as regulator or facilitator of the interaction. When it comes to *the outcome* of the interaction expressed in terms of institutional changes among the actors interacting, the implications are however problematic. An institutional analysis of the outcomes of interaction has sometimes the tendency to downplay the role of agency and imply a deterministic view of change (c.f. Beckert, 1999; Coriat and Weinstein, 2002; Nelson and Nelson, 2002). The same tendency has also become embedded in the idealised thinking of public procurement as a demand-side tool, emphasizing purchasing power, as a means to make suppliers respond and change towards certain exogenously specified behaviours. This paper gives reason to challenge such dogmatic understanding. The distinction between endogenous and exogenous institutions provides a case in point. The dichotomy implies that an exogenous change imposed on an endogenous institutional set-up is for the endogenous institutional set-up a matter of adjusting to the exogenous change to avoid remedies, but as far as possible leaving the long-term endogenous institutional set-up unchanged. One could argue that the implication for such institutional understanding of interaction reduces the expectations of what interaction can achieve. The point would be that interaction attained to render innovation can only be successful if there prevails already an institutional match between the endogenous and the exogenous institutions involved. In other words, no matter what interaction tools and techniques that are applied claims about the virtues of certain interactions in a given case should only be done with caution, as successes could be explained by the prevalence of institutional match rather than any attributes prescribed to the interaction. Similarly, reasons for failure might not necessarily be found in the interaction attempted, but in the institutional mismatch among interacting agents. An attempt to set up a power plant running on ley-crop in region with a large forest industry might be such an example.

Neither of the cases discussed here can be explained well by an analysis based on the understanding of public procurement of innovation as something that happens when a public agency places a bid for something which does not exist. Such snap-shot perspective may lead to an analysis that fails to take into account important developments evolving before the formal tender process is initiated. This is bad, as some of these processes might be important pre-cursors for the context in which the formal procedure is initiated. The Bio-fuel case gives a nice example. Taking account the events that evolved before the formal procurement process, it was a project spanning over 15 years. Local farmers had nurtured the basic idea of growing fuel instead of food a decade before the actual tender call was published. The formal procurement process became just an exogenous extension of the knowledge conversion that was already in motion. In the Wood-chip case on the other hand, there was a mismatch between certain endogenous institutions and exogenous ambitions included in the tender call.

Applying the Nonaka model in the analysis, drawing on an institutional framework, paves the way for an understanding of public procurement of innovation cases as those discussed in this paper as ideas evolving in endogenous contexts eventually to, at some point, become the target of formal procurement processes. In that light becomes public procurement of innovation a way of facilitating endogenous knowledge conversion. This perspective fundamentally alters how formal procurement processes should be understood. Rather than being an outcome of ‘demand” formal procurement process becomes instead an interface

between different institutional entities. Examples of such in the cases discussed here are the farmers in the Bio-fuel case, or the landowners and the NGO's promoting sustainable energy in the Wood-chip case. The fundamental implication that crystallises from this perspective is clear. The challenge for policy makers interested in promoting public procurement of innovation is to establish an institutional match between endogenous possibilities and exogenous specifications. Thinking of public procurement of innovation as demand or "command" for innovation might render the risk that important underlying mechanisms are ignored, which in turn reduces the chances of successful implementation of these policies.

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