Public Procurement as an Engine for Adopting Innovations: the Case of the Silver Coated Catheter

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Abstract

The role of the public agency as a pacer of private sector innovation has been increasingly emphasised the last years. Rather than addressing demand-oriented perspectives this paper focus on the public agency as an adopter of private-sector innovation. The paper reports from a case study on the introduction of a new catheter into the National Health Service Supply Chain and its diffusion among NHS trusts. Although it is probably still early in the diffusion process, different factors were identified which have had an affect on the adoption behaviour up to this point. The most general conclusion suggested by the case emphasise the importance of evaluating not only clinical evidence but also expected economic benefits from introducing an innovation into an organisation.

Introduction

The research reported in this paper ultimately aims at contributing to knowledge relevant for how the public sector can stimulate or pace (Gregersen, 1992) private sector innovation. In an economy characterised by global competition, it is commonly agreed that innovation is critical for our future prosperity. In line with this perception, the role of public procurement as a means to stimulate private sector innovation has been increasingly emphasised the last decade or so. This understanding is evident on the European level where public agencies have been described as “big market players” which “have powerful means to stimulate private investment in research and innovation” (European Commission, 2005, p. 8). In UK, initiatives are already in progress to make government “a smarter customer” where stimulating private sector innovation is a central theme (Department of Trade and Industry, 2004, p.11). It has been estimated that public procurement contributes with roughly 16% of European GDP (EC, 2004). For some countries, UK for instance, and in some market areas, medical equipment for instance, the share might be even bigger. This means that the public sector constitutes a purchasing power that, if managed accordingly, could positively affect innovation. The demand side of public innovative procurement has been emphasised (see e.g. Edler et al, 2006). The issue that relates to this general theme that will be discussed in this paper is how public agencies adopt emerging private sector innovations. As a complement to the prevailing focus on developmental technology procurement (Edquist et al, 2000, p. 21) this paper tries to add to existing literature by emphasising the role of adaptive public technology procurement of goods and services. In the light of the often mentioned public purchasing power, and the perception that “without diffusion, innovation have little social or economic impact” (Hall, 2005, p. 459) the objective in this paper

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is to study further how a large public agency adopt private sector innovations. More specifically, this paper reports from an attempt by the National Health Service (NHS) in England to procure and diffuse a new catheter throughout its Trusts. The research question addressed in the paper is formulated as follows. What factors determine the diffusion of the Bardex Catheter into the NHS?

**Theoretical Background**

Public procurement as a carrier of secondary policies (Arnould, 2004) is far from a new phenomenon (McCrudden, 2004). The public sector also applies a de facto technology policy through procurement and first use of innovations (Dalpé et al, 1991). Recent research concerns the role of public procurement in relation to market creation (Caldwell et al, 2005) and sustainable procurement (Walker et al, 2006). Public procurement has also been used to adopt digital technology in hearing aids in England (Phillips et al, 2006). Regarding innovation specifically, a public agency can influence demand by direct procurement, acting as a proxy customer (e.g. by creating standards) or as a linkage creator between suppliers and users (Rothwell, 1994). The demand-side approach, i.e. where “a public agency places an order for a product or system which does not exist at the time, but which could probably be developed within a reasonable period” (Edquist et al, 2000, p. 5) also suggest that public technology procurement may be a useful tool to stimulate innovation.

Diffusion, adoption and innovation are to some extent overlapping concepts that all capture aspects relevant for the purposes in this paper. An innovation may be seen as an invention that becomes commercially successful on a market, i.e. adopted by users, i.e. diffused. An innovation may also be incrementally altered over its diffusion time, i.e. exposed to post innovation improvements (Coombs et al, 1987, P. 130), which might affect the diffusion curve. In that sense diffusion and innovation are interlinked. One view that separates diffusion from adoption regards the former as the study on aggregate level, e.g. on a sample of firms or adopting units among which adoption would take place. Adoption studies understood in this perspective focus on the individual unit and try to further understand the individual adoption behaviour (Lissoni & Metcalfe, 1996). Still both concepts capture adoption behaviour in relation to a certain innovation.

Diffusion has been at least implicitly taken into account in research on technological development and economic progress since the days of Joseph Schumpeter. The methods originally came from other social sciences than economics or innovation studies (Lissoni & Metcalfe, 1996). Typical diffusion studies conducted in 1960s were devoted to evaluation of development programs in agriculture, family planning, public health and nutrition in Latin America, Africa and Asia (Rogers, 1995). Up to the end of 1970s diffusion research typically dealt with single products displayed in s-curve diagrams. Modern diffusion research is less focused on diffusion curves but has taken into account that diffusion is affected by other technologies and other social or economic developments. Compatibility, interrelatedness and co-development are themes in this multi-technology perception of diffusion (Lissoni & Metcalfe, 1996).

“The fundamental elements in the process of diffusion are the innovation which diffuses, the population of potential adopters and their process of decision making” (Coombs et al, 1987, P. 121). For the purposes in this paper, innovation is defined as “an idea, practice, or object that is
perceived as new by an individual or other unit of adoption” (Rogers, 1995, p 11). Diffusion then, is this idea, practice or object “communicated through certain channels over time among the members of a social system” (Rogers, 1995, p. 5.) The ‘idea’ studied in the paper is the Bardex catheter. The social system in this context is the NHS health care system in England.

The ‘newness’ in this context is connected to the decision to adopt a certain innovation. An innovation might be known by adopters prior to adoption. It actually has to be known in order to eventually become adopted. It is also likely that the innovation has “at least some degree of benefit for its potential adopters” (Rogers, 1995, P. 13). Given the newness of an innovation follows also uncertainty. The decision to adopt an innovation is determined by how it is perceived by individual adopters.

**Method**

*Research Design*

The case discussed in this paper was identified in the context of a study conducted in England and Sweden in 2006 involving multiple cases of public procurement. That study distinguished between three categories of public procurement projects, those that lead to innovation, those that involved procurement of mainly regular or of-the-shelf goods, and a third category; public procurement projects that could have been innovative should some factors have been in place. One of the objectives with the study was to compare different cases in the categories and eventually try to understand what causes public procurement projects to become innovative. Three public “sub-sectors” were selected, the health sector, national level procurement and local (municipality) procurement. Other branches of the public sector were excluded, e.g. the military sector as well as the education sector. One selection criteria was the judged possibility to get access to interview persons and data. In the English case such access was secured among the selected branches due to the rich network of practitioners connected to the research environment at the Centre for Research in Strategic Purchasing and Supply (CRISPS). Although indeed interesting as a stimulator of innovation, the military sector was excluded partly because of a perceived access problem and partly because the military sector operates under slightly different institutional conditions than civil public procurement.

For each of the selected sectors, a centrally positioned person likely to possess the relevant knowledge of the particular public sector was identified. This person was asked to identify one case for each category in the model. In the health sector the director of Policy and Innovation at NHS PASA played this role. The current case was identified as belonging to the third category, i.e. public procurements that ‘could have been innovative should some factors had been in place’.

*Data Collection*

One strength associated with case studies is that it allows the use of a variety of sources (Denscombe, 1998). Yin (1994) lists six sources of evidence that might be used in case studies, documentation, archival records, interviews, direct observations, participant observations and physical artefacts where the three first-mentioned were drawn upon here. Examples of documentation and archival records consulted were policy reports from e.g. Department of Health, or different agencies within NHS. Academic literature was also used. Most of the written documents used were available online.
In general, interviews can be carried out with different degree of openness. They can be of an open-ended nature, i.e. where a respondent is prompted to share quite freely his or her knowledge, opinions and propositions of the matter being studied. On the other hand, interviews can also be carried out in a quite restricted and formal way in terms of the sampling procedures used and questions asked.

The interviews carried out in this case study belong somewhere in between ‘open-ended’ and ‘focused’ (Yin, 1994, p. 84) on this continuum. This means that questions have been prepared in advance and it is expected that each interview will generate corresponding answers to these questions as far as they are applicable. It also means that the interviews will be carried out in an open-minded and conversational manner where it is also strongly recommended to make use also of additional information provided by the respondent that goes beyond the questions. By doing so, the interviews might provide additional information of interest to the case.

As part of the preparation a case study protocol as well as cover letter to be sent to interviewees was developed. Although consistent with the aims of the study, the questions evolved over time as the case unfolded. Also, statements made in earlier interviews or reflections on them were also allowed to influence later interviews for the purpose of triangulation.

Six persons contributed with data either through face-to-face interviews, telephone interviews or email communication. The way data was collected and informants searched for and selected resembled, once the case was identified, with conceptually-driven sequential sampling (Miles & Huberman, 1994, p. 27). This means that the selection of interviewees was purposive, rather than random. Interviewed people were procurement practitioners involved in the process to procure the new catheter, members of the rapid review panel, representatives for the supplier, Bard Ltd in England and staff at the Department of Health. All interviews were recorded and transcribed.

Analysis

It is assumed here that an analysis based on variables, and thus more open to universal conclusions would not allow for deep enough analysis. Instead a more comparative and holistic approach that suggests a focus on context and configurations (Ragin, 1987, p. 3) is chosen. This is an approach that is causally analytic (Ragin, 1987, p. 35) rather than emphasising on context-less ‘universal’ knowledge.

When results are treated, this is done in relation to its context. This will gain context specific knowledge. If this context-specific knowledge is contrasted to knowledge from other contexts, in a rigorous way, it can eventually render deeper general knowledge than a more rigorous and as such more shallow variable oriented approach would allow.

The analysis draws on applicable parts of the four elements that determine a diffusion process, as described by Rogers (1995). What has been included in the analysis is a selection of concepts used in a sensitizing way rather than a complete application of the entire framework. For instance, one element in the diffusion process is time. It is far too early to collect data about the full diffusion process as it has not yet have had the time to happen.
Following Rogers (1995) the diffusion process is determined by the character of the innovation per se; the communication channels by which information about the innovation is communicated; time under which adopters go through a process that may lead to the decision adopt the innovation; and the social system, individuals, groups or organisations that are engaged in “joint problem-solving to accomplish a common goal” (ibid, 1995, p. 23).

The characteristics that determine the diffusion of the innovation is determined by 1) the relative advantage of the innovation, i.e. to what degree the innovation is perceived as better than the item it supersedes; 2) The compatibility of the innovation, i.e. to what degree the innovation is perceived as consistent with existing values, past experiences and needs of potential adopters; 3) Complexity, i.e. to what degree the innovation is perceived as difficult to understand and use; 4) Trialability, i.e. to what degree it may be tested on a small scale before the decision whether or not to adopt the innovation is made; 5. Observability, i.e. to what degree the results of the adoption are visible to others.

Results

Background

In 2002, health care associated infection was identified as “a major problem for the NHS” (Department of Health, 2002, p. 62) and therefore listed as one of the key areas that should be prioritised in order “to combat the present as well as the possible future threat posed by infectious diseases” (ibid, p. 22). In December 2003, the potential benefits from using new technologies was mentioned as well as a concrete idea how to search for such opportunities: The Chief Medical Officer stated that a “rapid review process will be established to assess new procedures and products for which claims of effectiveness are made of their ability to prevent or control healthcare associated infection”.

The Rapid Review Panel and the Bardex catheter

In August 2004 the Rapid review panel was set up. Run by the Health Protection Agency on behalf of the Department of Health, the purpose with the panel was and is to encourage industry to come with ideas that would tackle the problems related to health care associated infection. The panel’s task is to “assess new and novel equipment, materials, and other products or protocols that may be of value to the NHS in improving hospital infection control and reducing hospital acquired infections” (Health Protection Agency, 2006). It is up to companies to submit evidence that they have a product that has some new properties and that it will control or reduce infection.

One of the first products submitted to the rapid review panel was the Bardex IC silver alloy coated hydrogel catheter, supplied by Bard Ltd. This was a catheter originally developed and sold on the US market. The supplier had provided information about the scientific background of the product, the evidence that showed it had antibacterial properties and then the most important factor in terms of implementation in a health setting, evidence that using it in certain population groups would actually reduce the number of health care associated infections. The rapid review panel agreed that it was a good product, it was new, it had antibacterial activity and that there were evidence that it would reduce the number of catheter associated infections if used in patients needing catheterisation for more than 48 hours. As one of very few products, the Bardex catheter
received the top mark, i.e. the judgment was that it had “shown benefits that should be [made] available to NHS” (ibid, 2006).

**Finding the Supply Route**

The NHS is one of the largest organisations in the world consisting of some 600 organisations. Within the organisation there is no stipulated route for the supply of consumables and any single NHS trust may utilise supply routes as they find most appropriate. In principle (for our purposes here) there are three routes for supply of consumables to a NHS hospital. Products can be ordered through an electronic ordering system, Logistics On-Line (LOL). The products that are in this electronic catalogue are supplied from one of the six regional stores managed by the NHS Supply Chain (formerly NHS Logistics).

A second option is to order directly from a supplier through a framework agreement negotiated by NHS PASA. These products are available online through the NHS E-Cat. These orders are placed directly to the suppliers with a reference to the framework contract number, and the supplier will deliver directly to the specified address and invoice the Trust directly.

It is also possible to order from contracts set up through public procurement on the local level. Similar to e.g. ordering from framework agreements provided centrally (by NHS PASA), the supplier delivers to a specified address and invoice directly the Trust.

These three supply routes differ in terms of the administrative complexity. Procurement through the NHS Supply Chain is the most straightforward as it is simply about ordering from the LOL. Buying products included in the NHS PASA framework agreements as published in the E-Cat requires awareness of the specific contracts as well as interaction with the supplier and is therefore slightly more demanding and time consuming. The third option, to manage the complete procurement process locally, is the most complex, as it requires development of contract specification, going through award procedures to find suppliers, and in the case of framework agreements ordering products.

The normal supply route for catheters into a NHS ward is through the NHS supply chain which is managed in a rather operational manner. For a nurse with responsibility for replenishing the stock of catheters on a ward it would be a routine task to use her electronic system. Deliveries come once a week in appropriate packages and the invoice will typically be handled by the supplies department at the hospital. A new alternative product that is not in the LOL system may face some difficulties to compete with existing products as it may be difficult to make people switch away from an easy supply route.

To order a product that is not in the system would possibly require the submission of a (paper) requisition and also interaction with the hospital’s suppliers department. This would also probably require more time, especially if the order is about something that is different. It might be the case that the wanted product is on a framework agreement administrated by the suppliers department. This is however also a longer and a more complex process than just ordering from an electronic system.

As a response to the result of the rapid review panel, NHS Purchasing and Supply Agency (PASA) “fast tracked” the Bardex catheter into the NHS Supply Chain. When the Bardex catheter
was introduced in England 2002, initially the only supply route available was the most complex one, i.e. it wasn’t on contract and neither was it in stock. When it became available from the NHS Supply Chain, in September 2005, roughly a year after the rapid review panel had published it’s result, the use of the product increased.

In 2006, about 30 NHS hospitals were using the Bardex catheter. An estimated figure suggests that the current market share for products in its range is 2-3%.

Discussion

The diffusion of the Bardex catheter into the NHS organisation can be analysed by assuming different perspectives. For instance, one thinkable perspective would emphasise the role of NHS as an innovation promoting agency where a central item is the product under study, the Bardex catheter. This is also basically the perspective by which this study has been set up. Another thinkable perspective would emphasize the NHS role as a health care provider, considering patients and clinicians who are in charge of the care that is provided. This latter perspective would also take into account paradigmatic norms embedded in the culture among the clinicians and also other factors that may effect operations.

Characteristics of the innovation can be summarised as follows. The Bardex catheter is a catheter with a silver coating that is claimed to reduce the risk of getting a urine tract infection. It is used in the same way as a traditional catheter; it doesn’t require any training or other change in the procedure with the patient. According to the rapid review panel’s judgement, the Bardex catheter is a good product that would reduce the number of catheter associated infections if used in the patients needing catheterisation for more than 48 hours. From the point of view of the rapid review panel, this is the advantage the Bardex catheter has over traditional catheters. The Bardex catheter’s disadvantage is that it is more expensive than traditional catheters. Studies indicate however that although the Bardex catheter is more expensive, it will save money in the end, as it will reduce the risk for patients to contract health care associated infections, and avoid unnecessary hospitalisation. It can from that point be argued that the Bardex catheter is compatible with existing values and norms. Although there is no sign of studies that challenge the general view that the Bardex catheter does what the supplier claims, the critique that has been risen concerns the limitations of the referred studies.

It should be noted that from a clinical point of view, the rapid review panel is strictly an indicative function. This means that statements are made based on the evidence taken into account whether or not a product does what is says it does, as reported from other studies. The panel does neither recommend nor provide mandatory directives whether or not to use a product. The decision to use the Bardex catheter is the clinician’s. Among NHS clinicians, infection control staff and continence advisors there prevails scepticism about the evidence base. NHS staff does not necessarily subscribe to the view that the silver coating used on the Bardex catheter help reducing health care associated infections. As it seems, up to this point, the rapid review panel’s rather encouraging statement about the Bardex catheter did not in it self lead to increased speed of the diffusion process.

What did happen as a result of the panel’s judgement was that the Bardex catheter was brought into the NHS supply chain by NHS PASA faster than it would have without the top grading given by the rapid review panel. Without it, any clinician in a hospital championing the Bardex catheter
would have had to go through the procurement process as discussed in the section called *Finding the Supply Route* above. The introduction of the Bardex catheter into the supply chain led to an increased use.

One issue related to the diffusion of the Bardex catheter was the problem with evaluating also the economic benefits of using the product. One perceived barrier was the problem of arguing for using a catheter that is more expensive that the traditional one. Partly, this is related to the nature of ‘saving’ by improving health care. Although the use of the Bardex might mean that unnecessary hospitalisation can be avoided, the savings are not clearly visible. You cannot, so to speak, measure what you didn’t spend. Another problem is related to the way budgets are organised. In some cases the potential benefits of the introduction of the Bardex catheter would not be visible in the budget affected by the increased spending on a more expensive catheter. Although total cost would be lower for the hospital, the incentives for a financial manager responsible for a budget to accept a cost without gaining anything would be low. Another thinkable barrier is related to the time delay associated with any framework agreements. Even if an adopting unit would like to change catheter, they probably wait until the current contracts are about to be re-negotiated. One comment made highlighted that the evaluation is not only about the Bardex catheter versus traditional catheters. In an economic organisation there might also be other priorities or potentially beneficial activities to consider that would improve the health service.

The need for an innovation is included in Rogers (1995) compatibility criteria. What seems to be common among the hospitals that have introduced the Bardex catheter is that among them there is a clear perception of the need to prevent and control health care associated infection. In these hospitals clear business case have been developed displaying the current level of catheter associated infections, the cost of them, and the expected benefit from introducing the Bardex catheter. What also seems to be a common theme is that the decision to introduce the Bardex catheter for a hospital is often made centrally, perhaps by the over all financial budget holder for the whole organisation. Some of the hospitals that introduced the Bardex catheter did that through an authority innovation-decision (Rogers, 1995, p. 372). While introducing the order codes for the Bardex catheter in the ordering system, they excluded the possibility to order traditional catheters.

**Concluding Remarks**

This paper provides a preliminary account of how the Bardex IC silver alloy coated hydrogel catheter has been diffused into the National Health Service in England. It is still too early to make statements on the degree of diffusion in the NHS. In the paper an attempt has been to discuss the factors that may affect the diffusion.

Examples of factors are e.g. the organisation of budgets and incentives to accept increased cost to replace existing technology, price of the existing catheter in relation to the new product, the decentralised organisation of the NHS where trusts are independent and autonomous, the importance of being on the NHS catalogue to allow for routine (catalogue) procurement and, and scepticism among professionals as to the properties of the silver coating used in the Bardex catheter.
One preliminary conclusion that can be made from this case is that introducing new equipment in an organisation should involve not only an assessment of the new product’s actual technical capabilities. Economical considerations and potentially other measures that can be used to create incentives that would enable diffusion in the organisation should also be taken into account. This in turn harmonises well with the recently made initiative to establish a Centre for Evidence Based Purchasing within the NHS Purchasing and Supply Agency. This is an organisation that was set up to “underpin purchasing decisions by providing objective evidence to support the uptake of useful, safe, innovative products…” (NHS PASA, 2006).

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