

A RESEARCH FRAMEWORK FOR THE ELECTRONIC PROCUREMENT ADOPTION PROCESS: DRAWING FROM AUSTRALIAN EVIDENCE

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ABSTRACT

This paper develops a research framework for addressing issues perceived as critical to understanding the e-procurement adoption process. Possible explanations relating to the adoption process by business are considered, accounting for the drivers and potential impediments. The discussion provides the basis for the development of a predictive model of the adoption process with relevance across activities, large and small firms and different products. Managerial implications are discussed.

BACKGROUND AND PURPOSE

The globalisation of markets is driven by forces related to the combination of an information based reduction of barriers to international trade, extending to businesses' own domestic market, through the reduction and convergence of transaction and transport costs (Braga, 2002). The globalizing importance of information and communications technology (ICT) at the macro and micro levels has long been understood in Australia. Australian investment in ICT is the third highest in the OECD as a percentage of GDP and is recognised as one of its strengths. This investment has placed the country among the top locations in the world for the availability, quality and cost competitiveness of its ICT workforce (DFAT, 2003), consistent with a second ranking (behind the United States) in the NOIE Index for e-business readiness (NOIE, 2002).

Australia's investment in ICT is also reflected in its leadership regarding the adoption of e-procurement. In 2001 Australia was one of only a few countries that enacted the extensive legal and institutional changes usually required by electronic purchasing systems (World Bank, 2001). The Australian e-procurement market was then expected to reach \$100 million in 2005 (IDC, 2001).

Procurement is a support activity for the purchase of inputs (raw materials, office and production supplies and information systems) for all parts of the value chain (Porter, 1980). Procurement activities aim at

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anticipating requirements, sourcing and obtaining supplies, moving supplies into the organisation, and monitoring the status of supplies as a current asset (Leenders and Fearon, 2000). Improvement of procurement processes in business to business (B2B) markets can lower the costs incurred in the identification and subsequent selection of the best suppliers, increase the value of purchases in terms of their price-quality relationship, and lower transaction costs associated with greater process efficiency. These improvements can highly influence supply chain management (Hardaker and Graham, 2000; Lancioni *et al.* 2000). ICT permits the use of electronic technologies for procurement (e-procurement), with the latter promoted by the Australian Government as a way of achieving these improvements, arguing that the adoption of e-procurement will directly affect Australia's competitiveness and prosperity in the 21st century (AGIMO, 2000).

In spite of the claimed national and business benefits that can come from embracing e-procurement, the extent of adoption in OECD countries is below expectations and progressing slowly. There is no indication that this is any different for Australia, a member state. Notwithstanding the importance of ICT and e-procurement for business, the extent to which Australia has been able to benefit from its investment in ICT has fallen short of expectations, a situation that is reflected in the realization that Australia has not captured the major benefits of being a producer of ICT goods and services (Houghton, 2003; PMSEIC, 2000). In addition, where e-procurement is concerned, little is still known about its role in the Australian marketplace (Hawking *et al.* 2004), a limitation that extends to the extent and nature of adoption by business. Although Australian businesses participating in the few studies dealing with e-procurement issues indicate an awareness of the many benefits that may ensue from e-procurement adoption, this did not preclude those studies from concluding that current adoption is very limited, used more for indirect than for direct materials and more for goods than for services. In addition, penetration prospects revealed by future intentions were found to be bleak (Stein and Hawking 2004), similar to findings for Canada, the UK (CeBI, 2004) and the USA (ISM 2001, 2003).

Contained within this macro view of sluggish national progress in e-procurement adoption there are major knowledge gaps as to its micro causes. Is the whole e-procurement process not favoured in usage or are there particular applications, such as the development and use of supplier on-line catalogues, that slow its widespread overall adoption? Are there significant differences in e-procurement adoption between industries? Are there significant differences in e-procurement adoption based on business size differences? Can differences in adoption be traced to the types of products businesses mainly procure? Anecdotes convey an uneven Australian e-procurement story: building industry suppliers are struggling to make e-procurement profitable; the online exchange centre is "littered with casualties", e-procurement in the construction sector is still distant, while parts of the e-procurement system progress unevenly, poorly in the case of online catalogues, strongly in the case of document management (AustralianIT, 2005). Understanding the national picture on e-procurement therefore requires addressing the business adoption process but models are lacking.

In seeking reasons why e-procurement is progressing slowly at the national level, this paper reviews the relevant literature for possible explanations relating to the adoption process by business, considering both the drivers and potential impediments. Based on this appraisal, a research framework is developed that seeks to address issues perceived as critical to understanding the e-procurement adoption process. The paper proceeds from a perspective of the benefits claimed from widespread use of e-procurement, in particular, what is known of the drivers for business adoption and its perceived impediments, as they apply to possible differences between small and large firms. The limited research identified leads to the proposal for a research framework that can provide the basis for a model of the adoption process with relevance across activities, large and small firms and different products. Systematic research of this form is required before government policies can be formulated that seek to increase the adoption rate. Policy-wise, implementing this research framework can provide answers that can help develop industry and business specific solutions for the difficulties that may hinder effective adoption and implementation.

DRIVERS OF E-PROCUREMENT ADOPTION

While e-procurement uses ICT, the drivers of the latter are not necessarily those of the former. Even within the introduction of new technologies, the adoption of management and production technologies differs between large and small firms (Jacob, 1998). In the adoption of soft process technology, the determinants also vary from technology to technology for firms of the same size class (Mole *et al.* 2004) linking to the observation that, in adopting ICT, the task for small firms is to understand the strategic and competitive implications (Raymond 1998, p.326). While ICT adoption models have been proposed, such models are not necessarily transferable to e-procurement adoption. One major problem is the conflict of the networking requirement of e-procurement with the finding of a limited integration between the Internet and internal systems in SMEs (Shiels, *et al.* 2003). SMEs may embrace ICT without adopting e-procurement.

At the public level, e-procurement facilitates unlimited and non-restricted access to government information and increases market transparency (no barriers to entry) and economic integration based on complementarities (Carayannis and Popescu 2005). It also increases international procurement opportunities for local businesses. Recognition of the potential benefits of e-procurement for Australian business is reflected on the establishment of web sites by federal and state governments to facilitate the adoption of e-procurement (OGO, 2001; PRC, 2001; NSW, 2000).

E-procurement has the potential to lower overhead costs associated with purchasing (Chircu and Kauffman, 2000), and to increase a firm's bargaining power. This power can result in better purchasing terms and conditions, better suppliers, more reliable supply of quality goods and services, better prices and, ultimately, lower all-inclusive purchasing costs. Purchasing cost savings add to profit (Simonaska, 2001; Tulloch, 2001; Wagner, 1993). For these type of reasons, e-procurement has been seen to have the potential to play a pivotal role in a firm's endeavours to "create a competitive cost advantage that lasts for many years" (Bloomberg *et al.* 2002), hence grounding sustainable competitive advantage. This is particularly important for Australia because ICT is the critical enabling technology and is a major contributor to national productivity and growth. This is a compelling motivation not only for e-procurement adoption by firms, but also for this adoption to be a matter of urgency given the belief that "early adopters will obtain maximum benefits" (Nestle, 2001).

Overall, e-procurement adoption in Australia may be below expectations due to a lack of understanding of the consequences from non-adoption and link to competitive advantage, a presumption that e-procurement is mostly for large businesses, and the notion that it is too early to assess conclusively (CFO Europe, 2003). In addition, there is evidence that the adoption process is complex and onerous, and intervention may be necessary to stimulate initial adoption and subsequent implementation. E-procurement adoption is an area of both threat and opportunity in terms of business productivity and competitiveness.

Common important drivers for e-procurement adoption are process design, international operational efficiency, and cost reduction and leadership. However, particularly conspicuous is the apparent lack of a perceived link between e-procurement adoption and competitive advantage. It is important to understand what may ensue from this state of affairs. Implementing a globalisation strategy relies on two strategic aspects: a marketing strategy and a procurement strategy. A global marketing strategy requires the same goods and services to be made available to the global market in the same way. A global procurement strategy prescribes that a firm select and use the best suppliers of the better price-quality inputs independently of geographical concerns.

ICT and the adoption of e-procurement are instrumental in these areas. If a firm does not adopt a global procurement strategy and its competitors implement a global procurement strategy, in the long run they may attain a cost-quality based competitive advantage. Conversely, a firm that neglects to select and use the best suppliers of the better price-quality inputs may not survive in the long run.

An additional implication is that competitors will be able to access the firm's traditional suppliers (as long as these are electronically available). In fact, even the firm's foreign competitors can do their purchasing

in the firm's domestic market. The conclusion is that it is not enough for a firm to decide about e-procurement adoption based on potential benefits and impediments that will ensue or influence that adoption - advantages and problems ensuing from a no adoption decision need to be assessed.

For an individual business, dealing with the impediments and accessing the benefits afforded by e-procurement can be argued to be essential for sustainable competitive advantage, possibly determining its survival. Arguably, businesses have no choice but to adopt e-procurement, or risk seeing competitors lure away their customers 'with Internet-based supply chains that are faster and cheaper' (Koch, 2000; Semple, 2005). The literature advances a large array of benefits driving e-procurement adoption (Tomorrowfirst, 2000). In the Australian case, a recent study identified price (process) reduction, unit cost, customer demand, administration costs and market intelligence as the most important drivers in this order (Hawking *et al.* 2004; Stein and Hawking, 2004).

There are also differences in e-procurement adoption between large businesses and SMEs. The adoption of e-procurement practices is likely to involve some departure from traditional purchasing strategies and methods, to involve changes in the process and criteria used by firms to select their suppliers, to require new skills and, in some cases, new capital investment in equipment. Hence different businesses may be more or less prepared to enact change whilst ensuring the on-going performance of the procurement function. It ensues that the extent of the adoption may be variable and resource dependent. Studies of e-procurement in Australia are limited to large businesses and little is known about e-procurement when small businesses are concerned. There are, however, indications that the situation for small businesses may be even bleaker, possibly involving drivers and barriers distinct to those applicable to large businesses.

As a result of Australia's investment in ICT, Australian businesses are generally proposed to be heavy users of information technology. However, in June 2003 only 72 percent of small businesses used computers and only 62 percent had access to the Internet, a prerequisite for e-procurement. The Internet was used mainly for E-mail, research and making or receiving payments (ABS, 2004). No information is available specific to e-procurement, but the situation with SMEs in Canada, where the use of e-procurement is negligible (Bray, 2004; CeBI, 2004), may be at least indicative of the situation in Australia.

IMPEDIMENTS TO ADOPTION

Even if the benefits of adoption and the potential strategic implications of e-procurement are recognised, the list of impediments for an individual business includes items that are major potential barriers for an effective adoption: risk, uncertainty, inefficiencies from supplier and catalogue-content readiness, cultural change, staff resistance, need for firm wide training with likely disruption of on-going activities

Each one of these makes it difficult for firms to implement e-procurement strategies, to the possible extent that the implementation may be deemed too difficult. In the Australian case, cost, top management support, inadequate e-procurement solutions, business partners and lack of skilled personnel were found to be important (Hawking *et al.* 2004; Stein and Hawking, 2004). In the case of small businesses in Canada, security issues and the realization that '*once committed to automating business processes, nothing in those businesses will ever be the same again*' grounds the argument that '*big businesses, universities and governments can survive e-business failures. Smaller businesses cannot afford them at all*' (Bray 2004: 6).

It has been argued that a firm that is not an e-procurement player now, most definitely will not be a major player in the future (Kiel 2000). This can be interpreted to suggest that it may be now too late for firms to adopt e-procurement successfully. While there may be important first mover advantages for firms, there is no evidence sustaining such a prediction. E-procurement is happening and has the potential to continue the creation of real value for all firms, even the laggards.

One possible explanation for a slow adoption process is that the adoption decision is complex— while many benefits arise in the longer term, major impediments and associated potential costs may be very short term (e.g. extensive staff training). Associated benefits and costs are difficult to estimate in real terms.

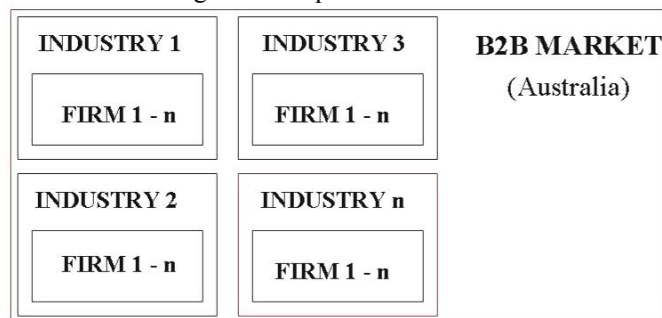
But firms need to consider the adoption decision. The essential fact is that e-trade (and therefore e-procurement) is open. Without careful analysis, no firm can see itself as shielded from the influence of e-procurement just by choosing to ignore it. Decisions about e-procurement can be essentially strategic, prompted by a variety of factors (e.g. supply chain considerations, long term contracts on hand, nature of customer-supplier relationships, organisational culture and industrial relations). More needs to be known about these factors given that there is little indication of which ones are situationally more or less relevant, or when they will apply. Furthermore, although there is a lack of information about e-procurement in the SME context, the suggestion in the literature is that the different context involves different benefits and barriers. Applying strategies designed for large businesses to SMEs may result in wastage of resources and the sought outcomes being missed. Importantly, it is apparent that the identification of the specific impediments to e-procurement adoption in given contexts is fundamental for the development of knowledge capable to facilitate that adoption. But the full benefits from the adoption will accrue only when post-adoption implementation difficulties are overcome.

A RESEARCH FRAMEWORK

The causes of the slower than expected take-up of E-procurement applications have been poorly researched at the industry, business and product level. Little is known about the adoption process with respect to small and large firm differences, which e-procurement applications are used, the type of products procured using e-procurement and which proportion of product types (for example, 'new task', 'modified rebuy' and 'straight rebuy') are mainly used.

To achieve an understanding of the situational factors that drive or inhibit the e-procurement adoption process at different levels of analysis - firm, industry and ultimately country, the following research framework is proposed (Figure 1).

Figure 1: Scope of the research



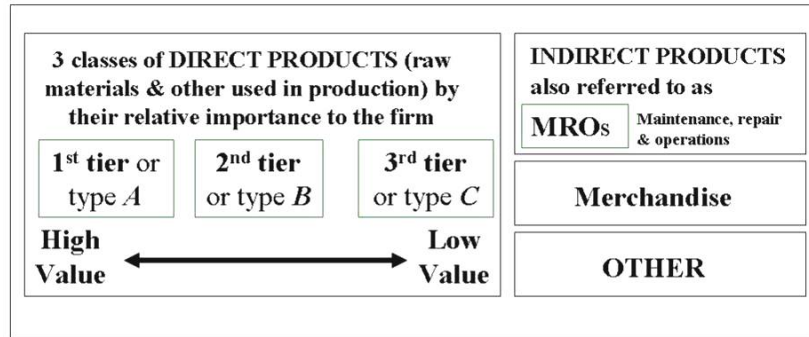
Following from the prior discussion of large and small firm differences, the unit of analysis needs to be firms grouped according to their size. Common criteria to identify firm size need to be used. Development of a firm typology to identify the level of ICT adoption prior to the decision about e-procurement adoption, and current status in the adoption process is required. The objective is to ensure that all situations are considered. For firms that have not commenced e-procurement, it is necessary to establish their technical capacity, auditing capacity such as EDI (electronic data interchange) and internal distributed networks supported by mainframe with multiple integrated applications. In terms of current status in the adoption process, an audit of applications can identify tools for supply based / strategic sourcing research; supplier directories / databases; commerce-enabled extranets with selected suppliers; demand aggregation with other businesses; E-matching; E-auctions (reverse, buyer control / forward, seller control / real time, batch); E-collaboration with suppliers; and supplier hosted web storefronts.

Analysis at the industry level must also be incorporated into the research design given differences in the competitive environments between industries and the differences in supply chain complexity between

activities. In B2B, it makes sense to group by industry defined at a level of aggregation suitable for practical comparison of results and covering primary, secondary and service industries.

A product typology must also be incorporated into the research design. The achievement of efficiency in e-procurement requires the segmentation of purchasing by type of product, with products of greater importance for a business remaining the core of the specialist purchasing staff. A classification developed by Hartmann (1993), provides great detail. Products are classified as direct products, indirect products, merchandise and other. Direct products, including raw materials and other products used in production, are distributed into three tiers reflecting their value for the business. Indirect products refer to products associated with maintenance, repair and operations. The product typology is schematically presented in figure 2.

Figure 2: Product typology



METHODOLOGY AND DATA COLLECTION

Preliminary exploratory research should be conducted first, by means of structured in-depth interviews with gatekeepers (in industry associations relevant to the population to be surveyed) and selected business managers (such as academic experts and practitioners). This preliminary phase is designed to create awareness about the project and about the benefits accruing to industry members, to achieve endorsement and to foster the goodwill of the associations and of the businesses they represent towards the project.

Departing from questionnaires available in the literature (for example, Lasch 2001), interviews should be used to ensure that all relevant issues, and only these, will be included in the questionnaire. Attention needs to be given to the perceived problems with e-procurement adoption, particularly those that may be circumstantial to the country, to the industry, or to the firm. Such a process affords a better understanding of the types of questions that should be addressed and assists in deciding the best way to approach the businesses to be surveyed (Burns and Bush 2000; Bradburn 1983). It is important to take these matters into account because the characteristics specific to an industry influence questionnaire design (Singh *et al.* 1990). In addition, endorsement by the industry associations is important because of its positive impact on response rates (Rochford and Venable 1995). Ideally, focus groups could have achieved these objectives better, but there are practical difficulties in bringing together busy community leaders and business persons. To minimize response error arising from inaccurate answers by respondents or misanalysis of the answers by the researchers (Malhotra *et al.* 1996) the final instrument should be subject to appraisal (for readability and completeness) and comment by the gatekeepers, prior to pre-testing. The sample should comprise businesses randomly selected from the memberships of the industry associations. The research design should take all necessary steps to ensure that the sample is representative of the population to be studied, and the response rate is high enough to validate the results.

CONCLUSION AND MANAGERIAL IMPLICATIONS

Despite the importance of adoption and the government efforts in pushing the use of ICT in business, the adoption rate of e-procurement in Australia is low. This may be because the understanding of the drivers of e-procurement adoption as well as perceived impediments, and how these vary between firms and between activities, is lacking.

Related to the observed low rate in e-procurement adoption, there is an urgent need for research that can ascertain variations in e-procurement adoption based on industry differences, business size differences and complexity of products. This is a necessary prerequisite to enable the development of a predictive model of e-procurement adoption that can assist in identifying firms, management styles and activities where e-procurement is likely to either excel or lag.

E-procurement is still a relatively recent phenomenon and the need for the research framework examined in this paper is apparent in terms of the inconsistency between proclaimed national and business benefits deriving from a faster uptake, and the slowness of adoption. A predictive model of adoption can be used to improve the formulation and targeting of industry and innovation policy by focusing on how to access these advantages and the removal of impediments. Improvement in the rate of e-procurement adoption will have national economic benefit through improved productivity that can strengthen Australian competitive advantage in rapidly adopting firms and industries. However, there is no call for the business sector to be innovative in the use of e-procurement, for the sake of innovation. Management orientation needs to be towards effectiveness and practicability.

Similar to e-business, some companies may find it difficult to adopt e-procurement successfully. However, it is important for managers to understand that a company which does not adopt e-procurement will eventually lose comparative advantage to those competitors who adopt the new technology. Business access to the advantages and the removal of the impediments in e-procurement adoption will be facilitated by industry-specific solutions. To the extent that these solutions translate into lower production cost, they will help to increase the competitiveness of local products against imported products.

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