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Exploring the business case for e-procurement

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Abstract

Purpose - Although e-procurement has been adopted in many industries, the business case for this technology has only partially been explored in the literature. This article investigates, through a case study approach, the extent of the business case developed for e-procurement adoption in three implementations.

Design/Methodology/Approach - The paper employs a case study method and examines three industrial firms through in-depth interviews with managers involved in the projects. The cases are presented and explored individually, followed by identification of relevant drivers and problem factors.

Findings - The research identifies eighteen drivers which can form the basis of a business case for e-procurement. A further seventeen problem factors are presented, which have the potential to militate the original case. It is apparent that the firms involved only developed a limited case for adoption and that there is a significant element of faith that the eventual results will justify the investment.

Practical implications - A framework of the business drivers for e-procurement is introduced, in the form of a multi-attribute hierarchy. This framework can assist managers to classify relevant issues in assessing and developing the case for e-procurement adoption.

Originality/value of paper - Whilst the literature offers theoretical benefits for e-procurement, the paper provides managers and researchers with empirical evidence of the drivers for this technology and of the problems encountered in implementation.

Keywords: e-procurement; purchasing; IT; business case; case studies

1. Introduction

From the late 1990s a raft of new e-commerce technologies emerged which promised to revolutionise working practices, threaten existing businesses and potentially create new business models (Sinha, 2000; Barua *et al*, 2001). Following this growth in use of e-commerce in business to business markets, there has been significant adoption of new supply chain-related technology and applications by organisations globally. The procurement function has been particularly affected by this trend with a predicted growth in e-procurement applications covering both transactional buying and strategic sourcing activities (Corini, 2000; Croom, 2000).

One of the factors behind this development has been the evolution of the procurement function towards a more strategic role in supporting both corporate goals and supply chain objectives. The purchasing expenditure in relation to cost of good sold averages 50% and may be as high as 80% (van Weele, 2007), therefore reduction in cost of bought-in goods and services has been a major focus in much of the merger and acquisition activity though the 1990s and 2000s. Corporations recognise the potential for increasing both profits and stock values by aggregating the buying power of recently-merged organisations and reducing spend with external suppliers to the business. This goal and other drivers within the function have led to greater recognition of the need for tools and technologies which can support procurement managers in increasing their productivity and contribution to value creation.

The applications which form the e-procurement landscape are designed to automate the buying cycle, optimise spend, improve process and workflow, support bidding and tendering, and facilitate more effective search for products and services via the internet. It has also been suggested that such technologies will lead to closer collaboration and integration within the supply chain (Garcia-Dastugue & Lambert, 2003; Johnson & Whang, 2002), although this is not necessarily an objective where applied to indirect or non-production spend. Whilst there are definable benefits from e-procurement, in the early days of the internet boom there was without doubt considerable hype about the dramatic changes these technologies would produce, and there is emerging evidence on the realities of e-procurement and some of the difficulties which adoption entails (Davila *et al*, 2003; Angeles & Rath, 2007).

A further complication is that e-procurement encompasses a number of different technologies and solutions with varying levels of functionality and complexity. A number of authors have defined the mechanisms within e-procurement (Rajkumar, 2001; de Boer at al, 2002; Wang et al, 2004; Quayle, 2005; Nagle *et al*, 2006; Pearcy & Guinipero,

2008: Bakker *et al*, 2008). These authors take a different stance on what is, or should be, included within the definition, so there is no clear consensus. Some definitions admit applications which engage with specific transactional elements such as automated buying tools, catalogue systems and online auctions; others include functions such as planning, scheduling and collaboration between trading partners. Within this paper, the focus will only be on the specific transactional applications which were used by the firms investigated. A definition of these mechanisms is provided in Table 1.

Table 1: Definition of e-procurement applications used in the case firms

Tool	**Characteristics**
Buying/ RTP application	An application hosted by the buying firm to allow users to search for products, place and track orders, receive and pay for purchases. Uses catalogues provided by suppliers or draws product data from supplier sites through punch-out. Automates the 'requisition to pay' (RTP) cycle.
Supplier catalogue sites	Web sites hosted by an individual firm which displays its product range in an electronic catalogue. Allows customers to order online, usually using point and click system, linked to shopping basket, check out etc. Designed by suppliers as a channel to market.
Electronic marketplaces	Web portals which offer an online store for buyers and suppliers to conduct transactions. Suppliers offer content, allowing buyers to browse in multiple catalogues on one site. Marketplaces may be 'horizontal' in offering a wide range of products such as office supplies, or 'vertical', related to a specific industry or sector.
Reverse auctions	Online, real time bidding events where buyers offer a contract to specified suppliers, who make reducing bids in order to gain the business. The winner in principle is the lowest bidder, although a range of criteria may be used to award the contract. Terms and conditions for the event are specified by the buying firm.
e-RFX	A suite of applications which support buyer analysis of supply markets and suppliers. Includes search tools, supplier rating and scoring systems, bid analysis tools, evaluation techniques. Designed to improving decision-making by buyers.

The aim of this paper is to explore the business case for e-procurement. All business investments need to be the subject of suitable assessment and evaluation and whilst the literature suggests potential benefits of these technologies, little has been written on the nature of the business case for e-procurement and how it has been developed by buying firms. The term 'business case' has been defined in a number of ways. The UK's Office of

Government Commerce suggests it is used "to obtain management commitment and approval for investment in business change including projects and programmes, through rationale for the investment" (OGC, 2009). The Interoperability Clearinghouse defines it as "a structured proposal for business improvement that functions as a decision package for organizational decision-makers" (www.ichnet.org, 2009).

For this research, three large organisations were selected for examination who had implemented e-procurement, to establish the nature of their individual business case. The research further examines the outcome of their projects to assess factors which militate the original case. The structure employed is to present a review of the relevant literature, followed by discussion of the methods used in the research. The case histories are then presented individually, with a synthesis of the findings from the three cases. Subsequently a framework is introduced which summarises the key variables identified and allows us to draw conclusions on the findings and provide indications for further research.

2. Literature review

The literature on e-procurement has been steadily growing since the late 1990s when articles began to appear on the impact of the internet and e-commerce on supply chain management (SCM). Prior to this, the focus of discussion within SCM had been on electronic data interchange (EDI) which has been replaced almost entirely by web technology and is therefore largely ignored in this review.

There has been a broad analysis of benefits and disadvantages of e-procurement, within the literature. The advantages cited include lower purchasing costs, achieving compliance to contract, improved communication, enhanced planning, reduction in transaction costs, faster cycle times and improvement in procurement personnel efficiency (Tatsis *et al*, 2006; Ash and Burn, 2006; Puschmann and Alt, 2005; Lancioni. 2003, Presutti, 2003). Similarly there has been discussion of the barriers or disadvantages in implementing e-procurement, which include technology immaturity, problems in implementing change, potential conflicts with suppliers, inability of SMEs to materialise savings, and cost of implementation (Angeles & Nath, 2007; Tanner *et al* 2008; Hawking, 2004; Shakhir *et al*, 2007; Quayle, 2005; Min & Galle, 2002). Angeles & Nath (2007) in particular explore the challenges to e-procurement and identify three important issues, namely lack of system integration and standardisation, immaturity of e-procurement market services, and maverick buying/difficulty of integrating e-commerce with other systems. Other relevant issues to be explored include adoption of the new technologies (Batenburg, 2007; Pearcy *et al*, 2008; Gunesekeran & Ngai, 2008; Tanner *et al*, 2007), success factors (Versendaal

2003; Puschmann and Alt, 2005; Gunasekeran & Ngai, 2008), and the impact on organisation and costs (de Boer, 2002; Brun, 2004).

Whilst this literature grows, there has been little evaluation specifically of the business case for e-procurement. It may be argued that the benefits identified from existing studies can help to create a basis for a business case, but this has to be balanced with the evidence of barriers, risks, and adoption or implementation problems. The evidence of such problem areas is now emerging from more recent studies. Croom (2005) states that there has been poor validation for many e-business projects, with survey results indicating that the justification from adopters is based mainly on squeezing out costs. In another survey-based study, Tanner *et al* (2008) showed that the potential and benefits of new IT investments such as e-procurement are difficult to appraise. Similarly, Rajkumar (2001) suggests that benefits may prove difficult to measure as there are less visible costs in such implementations including consultants, integration, catalogue development and staff training programmes. Abery & Glindemann (2004) noted that alleged process cost reductions are a myth and a case based upon process improvement alone will not justify the investment in e-procurement. In an examination of smaller firms, Min & Galle (2001) observed that smaller businesses may lack e-commerce capability and so reap fewer rewards from such technologies; hence cost of entry may be too high and benefits would be less extensive.

In a rare example of analysis of financial benefits from electronic commerce in procurement, Mukhopadhyay *et al* (1995) in their study of EDI implementation by Chrysler with its suppliers, established that the firm had gained cost savings equivalent to $62 per vehicle, although they noted that in such projects it may be necessary to reduce the number of suppliers as some may be reluctant to incur additional expenses or make the necessary IT investment. Research by Brun *et al* (2004) developed a modular methodology for evaluating e-procurement projects using financial and operational criteria.

In a study of web-based applications, Ellram & Zsidisin (2002) used transaction cost analysis (TCA) to justify using technology to support purchasing management. Presutti (2003) argues that a business case requires the firm to show a link between e-procurement strategy and financial performance. He further proposes the use of Economic Value Added (EVA) as a financial measure in establishing this case.

Citing a report from Deloitte Consulting, Corini (2000) claims the business case for e-procurement is clear as companies can expect to achieve a return on investment (ROI) of 30% in the first two or three years. However the actual savings achieved can be difficult

to capture as they relate to 'soft' areas such as transaction cost reduction. Similarly he cites supplier resistance as an issue which must be addressed in the business case along with rationalising supplier numbers. This point is supported by Deeter-Schmelz *et al* (2001) who state that suppliers play a critical role in successful adoption of e-procurement. Min & Galle (2002) also stress the importance of ROI, citing examples of reductions in purchasing price, inventory and cycle time. Taking the ROI debate further, Quayle (2005) suggests that often the cost of change is undertaken without full benefits being clear, therefore firms should set a target ROI, covering cost of capital expenditure as well as items such as internal resources used and time allocated. In the UK, the Office of Government Commerce has developed a business case formula as part of its national e-procurement project initiative. This provides a checklist to the public or governmental sector on how to create benefits and value from such investments (NEPP, 2009).

Offering perhaps the broadest evaluation of the business case in e-procurement, Subramanian and Shaw (2002) stress that the evidence of benefits from web technology is anecdotal and that there are few studies which explore the issue of value. However they state usefully that different web-based models or technologies have a different way of creating value. Few models for e-procurement evaluation have been proposed in the literature. Smeltzer and Carter (2001) suggest a Benefit/Implementation Cost Framework which uses cost/benefit analysis. Similarly to Subramanian and Shaw (2002) they propose that a different case can be made for different e-procurement 'activities' with each potentially having its own value propositions.

Looking more broadly, since the significant growth of IT usage in the 1980s, there has been discussion of the case for information technology through analysis of value delivered by IT investments in general. Evidence suggests that it has been problematic to establish the value actually contributed by IT. Weill and Olson (1989) provided a review of research on IT projects and demonstrated that there was a problem in showing the impact of IT investment on firm performance. In a subsequent review of the literature on IT, Brynjollfsson (1993) identified the 'productivity paradox' and cited four factors explaining why, over the course of a range of investments, IT had not measurably improved productivity. These were:

1) measurement error;
2) lags (i.e. in achieving pay-off from investment);
3) redistribution (IT could be privately beneficial but not adding to total output);
4) mismanagement.

Barua *et al* (1995) identified that commitment to IT investment required an even larger commitment in faith and suggested that gains from IT projects in previous decades had been shown to be inconclusive, with some showing little or even negative impact, whilst others showed a positive impact. In effect, they suggest that benefits from IT investments are often elusive or problematic to quantify and measure. It was found by Farbey *et al* (1993) that in only 50% of cases were IT projects subject to a formal pre-investment appraisal process, and in only 30% of cases was the investment outcome evaluated. It has also been identified that over 80% of IT directors consider cost-benefit analyses for IT to be a fiction, and one CEO suggested there was a spontaneous conspiracy to exaggerate the benefits (Grindley, 1993).

In a more recent study, Ashurst *et al* (2008) have demonstrated that one of the major problems in IT projects is effectively managing change and cite evidence that in the 1990s up to 90% of projects failed to deliver benefits. Moreover, Sircar *et al* (2000) have proposed that some researchers have given up on trying to correlate results with IT projects and advocate focusing instead on the processes IT is supposed to enhance and how this should be executed.

From this review we can draw two important conclusions:

1) there has been a long-term problem with identifying value from IT investments and in creating a case for IT introduction in general;

2) to date there has been only a partial and fragmented business case established for the deployment of e-procurement specifically.

3. Methods & Objectives

It is apparent from the literature reviewed in this paper, that there has been a generic problem in measuring the value of IT and in building a case for making such investments. In relation to e-procurement, the business case has been marginally explored, and in most of the studies to date there has been an assumption that the benefits identified (although often from theoretical, rather than empirical research) justify the deployment of such technology. Consequently the objective of this research was to explore the realities of the business case for e-procurement in a selection of firms, and to understand the factors in the decision to invest in this technology.

It was also identified in the literature that much of the research undertaken hitherto on e-procurement has been survey-based. These studies will by their nature focus on generalisations such as statements that firms are more likely to adopt e-procurement if they are large in size or have higher levels of IT capability (Soares-Aguiar & Palma-dos-

Reis, 2008). Such statements, whilst valid, are of limited use to individual firms, even if they reflect the identified criteria for adoption. The approach in this study was to explore, through company examples, the specifics of some e-procurement project experiences, and a case-based approach was selected. Case histories can illustrate the real impact of technologies such as e-procurement and define in depth and in context the nature of the decisions made and the achievements experienced by the firms examined.

Case research is particularly suitable for new or developing areas of practice where knowledge of the phenomenon is limited or not well documented (Yin, 1994). Stuart *et al* (2002: p. 422) describe the research strategies possible within case research and following their classification, this project seeks to explore ("what are the key issues") and to identify critical factors ("what are the key variables"). Similarly, it has been noted that whilst research on organisations is usually characterised by large, multi-industry samples, research within organisations requires thick description and data derived by direct or participant observation (Dubois and Araujo, 2007). Such case study research allows a level of intimacy with the subjects under study, which compensates for the low number of examples explored and the resulting issue of generalisation of results.

The purpose here then was, through an inductive approach, to develop insights and propositions, rather than to measure results or outputs quantitatively. A method was developed following the example from a study in the Greek food industry (Tatsis *et al*, 2006), although in the project described here, the firms selected are all multinationals involved in buying and trading in international markets. The firms are situated in varying business sectors (consumer products, telecommunications and chemicals) however they possess some common characteristics such as operations of similar size and scope, being at similar stages of usage of e-procurement and deploying a range of e-procurement applications. These cases were selected as they possessed the potential to be particularly revelatory and offered deep levels of research access (Eisenhardt and Graebner, 2007).

The aim of this research was to demonstrate the extent of the business case developed for the e-procurement implementations, and to uncover what factors were encountered subsequently which affected the original case. These militating factors resulted from the adoption programme in each company, however here the details of e-procurement implementation are not specifically discussed as they are explored in a separate paper. For this investigation, three key research questions were articulated:

RQ1 What were the drivers for e-procurement adoption? What kind of business case, if any, was proposed for the project? What issues during or post-implementation affected this business case?

These questions were considered to be important as there is virtually no research evidence on how managers reach decisions on e-procurement; similarly the case examples published are generally lacking in providing evidence of the problems encountered in adoption (Tatsis *et al*, 2006; Cagliano *et al*, 2005). The research therefore seeks to contribute to knowledge in this domain by providing empirical examples of origins for the business case for e-procurement, and of implementation issues which militate that case.

Once the firms had agreed to participate, time was spent identifying the appropriate respondents. Those selected were managers who owned the projects or were close enough to the e-procurement initiatives to give valid responses i.e. those involved in the initial project set up and/or ongoing management, as well as senior executives. The senior purchasing executives were interviewed initially in order to establish much of the background to the projects and corporate level drivers. Middle or lower ranking managers were then interviewed with the same question set. Perhaps unsurprisingly, the lower ranking managers were usually able to provide more insight into the reality of the project as they had usually struggled with day to day issues of implementation and change.

A minimum of three respondents was used in each organisation and these interviews took place over a number of weeks during 2008. The interviews were recorded and the resulting transcripts were coded for further analysis. A coding system was developed from prior work conducted by the researchers in a related area and informed by concepts derived from the literature. Techniques used in coding and interpreting interview data were based on suggestions from Miles & Huberman (1994).The approach taken was to conduct within-case analysis, tabulating responses in key areas, then to undertake cross-case analysis to compare and contrast results, leading to synthesis of key themes. The initial findings are described below as individual cases, focusing on the research questions covering drivers, the business case and issues arising from implementation.

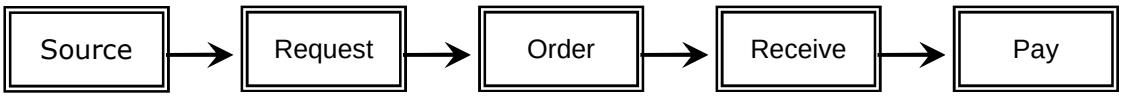
The interview responses were supplemented with documents and records from within the three firms. This included: internal presentations and training information, data on spend and purchasing performance, specific examples of use of e-procurement tools such as e-auctions and catalogues. These various sources allowed validation of responses against a range of supporting data, and provided a rich picture of these firms' experiences. Limited claims for generalisation can be made from three case studies, however the objective here was to provide, through empirical evidence, valid insights into an area where little research evidence existed.

In the following sections, the discussion of drivers identified in the research is followed by presentation of a theoretical framework, based on a hierarchical model. The factors leading to the hierarchy and the proposed model itself were reviewed in a second set of discussions with a representative from each company who was involved in the original round of interviews. These interviewees were invited to critique the findings and through iteration, the factors were classified into appropriate headings to create the final model. This is designed to enhance understanding of the components of the business case for e-procurement and to aid decision-making by firms planning to adopt such technology.

4. Case studies

The literature identifies a range of applications and mechanisms which can be classified under e-procurement (as shown in Table 1). In these cases the focus is primarily on the use of buying applications which aim to automate the 'requisition to pay' (RTP) cycle as illustrated in Figure 1. Such applications can be an existing function within systems such as SAP, or stand alone versions which can be integrated into ERP applications.

Figure 1: The 'requisition to pay' cycle of e-procurement buying applications



Case A

Company A is a consumer products firm which manufactures in several locations across the world, supplying product to the global markets under various brand names. The central Procurement team which determines overall strategy is located in the UK Head Office, supported by regional and local procurement groups.

At the time of this case study research being undertaken, the firm had been involved in its e-procurement project for two years, and had implemented a range of solutions at different points. The approach to segmentation of the different applications available was based on the Kraljic (1983) risk/value matrix which is used in the firm as one of the principal tools for strategic decisions. Reverse auctions have been used on a limited basis for leverage, and some routine products. RFX tools such as vendor search, tendering, supplier qualification and evaluation, are deployed across a range of segments, to assist in the contract award process. Similarly the firm has deployed an online buying tool based in SAP which automates the RTP cycle. This buying tool was being used successfully for a range of categories, where there are no obstacles to the buying transaction being automated.

The initial push behind these projects was a global programme devised to manage the indirect spend which hitherto had been under local control. The firm set a target of savings of approximately 9% of its global indirect spend of £2bn. However this figure was an estimation as its existing systems and reporting were unable to produce a reliable spend figure. It also identified that some e-procurement tools had been adopted locally without any real co-ordination. The central procurement team recognised the need to establish a common global process and database against which to manage this savings programme and saw e-procurement as the means to drive achievement of the targets.

Some additional drivers which the firm recognised relate to varying stages of the procurement process. The first of these was standardisation. The firm was establishing a SAP platform for the business and the use of common applications would enable a standard approach to spend processes. Knowledge sharing was seen as important and common e-procurement tools would act as an enabler. A point stressed by managers in the firm was the need to move resources from transactional to strategic activity, also defined as changing focus to higher value-added activities. This in turn was seen as improving productivity from people. Gaining control over spend was cited and relates both to spend compliance and to approval levels. Supporting this point, the firm identified better visibility of spend as essential, in order to manage cost reduction targets. Finally, the result of better visibility would be improved supplier management, as the firm would be able to identify areas for process improvement and cost reduction through improved supplier information.

Looking back at the roots of the project, these drivers were clear for managers interviewed, although they were honest in admitting that the business case put forward for e-procurement was less well articulated. The drivers discussed are all based on certain assumptions of what e-procurement would produce i.e. improved data, visibility, common standards, improved process etc. In response to the question of what level of business case was put forward prior to starting any e-procurement project, one manager stated:

> "that's a very good question; a document was put together but I think it would be very kind to call it a business case because I don't think it had many numbers in it"

This respondent offered a further revealing quotation on the reasons for this:

> "it was quite informal compared to what you might do for a standard IT implementation; if you are going out to buy an SAP system for example, you're normally going to do a detailed business case, but it's interesting how a lot of

companies fudge that issue (with e-procurement); it's a bit of a 'wait and see' situation and there's faith that the outcomes will justify the investment".

This respondent mentioned that he had experienced a similar approach in his previous position in another multinational corporation.

Two further managers interviewed in this case example agreed that although there were legitimate drivers for the projects, the business case had been vague and the principal reason for this was the lack of understanding of what benefits could actually be realised. It was also interesting in this instance that little or no consideration was given to benefits for, or impact upon, the firm's suppliers.

Turning to the firm's experience of implementation and problems in relation to the business case, the main driver was the lack of information on indirect spend which had been a major problem before implementation. The e-procurement system did not solve this problem as the firm had expected, with full spend visibility not yet being available. The respondents admitted that they had not really understood what the technology would deliver in this regard. The issue had been further complicated by the differing accounting and reporting regulations in various parts of the world, which had tended to drive data availability in financial systems. The respondent responsible for this particular element revealed that the firm had engaged an additional software company to do a more detailed analysis of its global spend data to provide the granularity it required. She disclosed that:

"I think we went into e-procurement with a slightly false business case; we thought we could put 100% of our spend through it and it would just sort out any visibility issues. I think initially there was disappointment that it wasn't delivering what it should; the fact is there's more than one procurement channel and now that's been recognised we are in a far better place".

A further problem area had been the change in people's job functions, which the firm had underestimated. The managers in firm A were realistic in stating that they had been poor at dealing with the change to roles and tasks which the e-procurement systems introduced:

"we underestimated the amount of change management that would be needed; in terms of training we were poor because we were training only from a technical perspective rather than from a business process perspective".

Similarly the changes in roles at both central and regional locations were not clearly delineated, leading to confusion over where responsibilities lay once the new systems

were being introduced. A learning point for the firm was that the move from transactional to strategic activities will be slowed if the change elements and resulting roles are poorly executed, which in turn can forestall the achievement of important savings targets.

Case B

Firm B is a European based telecoms business which, like many firms in this industry, experienced increased competition in its markets, causing increased focus on cost management. Procurement was managed from a central Head Office location with over 100 personnel originally involved in the function, supported by local employees in regional markets.

The firm had undertaken its e-procurement project over a period of 2-3 years and had adopted a number of solutions to address specific issues. Initially the focus was on the automation of the buying process and a web based system (SAP/BBP) was implemented to manage the requisition to pay cycle. Reverse auctions were adopted in only a limited way and other tools to support sourcing and market intelligence were introduced once the basic buying application was functional. The buying system was the focus of most of the project as the firm embarked on a sophisticated integration programme, whereby the buying tool would be integrated via web technology with external internet platforms such as third party marketplaces and some vendor-managed portals. To ensure reliable implementation practice, a pilot project was undertaken to establish proof of concept before the system was rolled out to business units.

A key issue in the business was that due to poor management information the firm had unreliable data on its expenditure to such an extent that the total global spend figure ranged in estimate from Euros 3bn to 5bn. The drivers for the e-procurement programme related to this spend target analysis and additional issues as shown here. Firstly, compliance to contract and preferred suppliers was a major concern – although the HO team established central contracts and in theory regional businesses would order against these agreements, record keeping was poor. Allied to compliance is the issue of management information which an e-procurement system was expected to deliver: suppliers often had to be asked how the firm was performing against contract. Next, vendor price reductions were established as a key driver, however until proper reporting was established it would be difficult to monitor the level of savings being achieved. The firm was equally concerned with transaction efficiency, namely reducing cost of purchase order transactions. Finally, the firm identified the need to improve prompt payment to suppliers where the performance was unacceptable. This in turn had led to poor relations with some suppliers and affected contract negotiations.

In effect the approach was that e-procurement should support a wider transformation programme within the procurement function. The Head Office central team would be reduced by over 50%, with transactional buying being de-centralised and the central team focusing on strategic activities. This approach led to the presentation of a financial business case, which had to be drafted in accordance with normal capital expenditure rules. Costs of the project and benefits based on key drivers were established. Full details of the case cannot be revealed here, however total costs in the implementation were established at circa Euros 70m, including for example: system/software purchases, back-office re-engineering, consultancy and training support, staff re-deployment and redundancy. Initial vendor price reductions and benefits were established at circa Euros100m, representing an estimated 2% of global spend in all categories. However this figure, produced by the e-procurement project team, was recognised as fairly speculative, given the poor legacy data. Interestingly the senior procurement manager interviewed in this project added that this was not just about the savings – the firm wanted to demonstrate to the marketplace that it could show leadership in this technology and use it further as a public relations exercise.

Although subsequent outlays and financial benefits obtained remain confidential, it is clear the firm was able to rationalise a clear business case. However, there have been some problem areas which have affected the delivery of that original case. Echoing firm A, one respondent in the firm admitted that they had underestimated the impact on people:

> "there were a lot of people and structural changes, but as a change management project, this has probably failed; we have had to employ a communications person to put across the message effectively about what we want to achieve. Change never finishes in fact, it goes on forever with developing people".

This had made the transformation of staff roles and subsequent headcount savings more difficult than anticipated, leaving significant organisational cost savings unrealised. The firm was also involved in a head hunting exercise to try and identify the right people to work in the new highly computerised environment.

The impact on suppliers was still being assimilated and respondents advised the firm would probably have to scale back its intentions of automating all transactions globally. In some smaller markets, the cost of implementation of the buying system would outweigh the spend, l*et al*one potential supplier price reductions. A further problem area was integration. The ambitious target to integrate across a range of external platforms had been problematic and although much was achieved, plans here were also retrenched.

Lastly, the senior executive interviewed in this project admitted that they had set the wrong targets for savings, as legacy spend data had been poor.

Case C

Company C is a manufacturer of chemicals used in industrial and agricultural markets, serving primarily the European and North American markets. The data from this case focuses on the European activities of the firm. Procurement exists as a HO function with some centralised personnel, although many of the procurement specialists are attached to individual business units located within markets.

The firm, at the time of the case research, had been undertaking its e-procurement programme for approximately 4 years and had advanced from trials with buying applications through to full-scale use of a range of mechanisms including auctions, RFX and sourcing tools. The main focus had been on the RTP cycle, using the buying tool in its ERP system. The firm had experimented with catalogues and supplier systems but today has its own buying application integrated with an independent industry marketplace which offers full transactional capability through access to supplier catalogues hosted on its site. The buying tool was initially used to acquire indirect purchases but the firm later on to buy production materials through the system.

The over-arching rationale for the e-procurement project was lack of data on spend. The firm admitted that previously it had weak procurement information, providing very little data on which to act in improving spend management. This lack of information also led to poor visibility of supplier performance, institutionalised lack of compliance and unsatisfactory analysis and interpretation of the supply base and supply markets. The firm recognised it would be unable to leverage its buying power without supporting management reporting and simplified process. Based on pareto analysis, it had already established that there was a long 'tail' of suppliers and there was a need to reduce supplier numbers through consolidation of purchasing in many categories. It was considered that e-procurement would improve visibility of spend and compliance to preferred suppliers, leading to a reduction in the supply base. All of these issues were therefore drivers for the project.

Further, there was a mandate to transform the role of procurement from what was seen internally as a support function advising on purchasing practice, to a strategic activity which could drive higher standards and improved productivity. Hence the programme was seen as necessary to change the function's role from transactional to policy-making. To do this the procurement managers needed to be relieved of routine ordering tasks and empowered to direct current and future strategy.

The discussions with managers in the firm only focussed in this example on indirect materials rather than the full spend profile. A business case had been established for the areas of spend under their control. The basis of the case was a budgeted circa 10% saving on the average annual indirect spend of US$1.2bn. As in case B, this figure was highly speculative and was partly based on suggestions from e-procurement vendors. However no budget had been fixed for the costs of implementing e-procurement. As in other examples, the company provided what it considered a fair estimate of savings from vendors through improved data, process and supplier management. This estimate was however frustrated by poor legacy management systems. As one of the managers interviewed stated:

> "There is a problem in measuring the difference between then and now. Because we did not have very good information before on how we were doing, we can't see exactly how much we have improved".

Some of the observations made in case A are relevant here, as there was an element of faith that the benefits and savings would be delivered through e-procurement. However it can also be observed that the need for a change in process, structure and roles was driving the move to automation and that measurable savings were almost secondary to the transformation in procurement practice itself.

The problems encountered in this case show similarities to those in cases A and B: re-training was more complex than anticipated; new staff had to be hired; a lengthy process was required to sell the changes to internal managers; poor information on past performance hindered progress. Additionally, the company identified the following concerns: buying systems not as user-friendly as commonly used sites e.g. www.amazon.com; need to replace software over time as functionality developed; reduction in supplier numbers not easy to achieve. Nevertheless, this firm had progressed to the point where the transformations in roles had begun and there was now much more focus in the business on effective management of the supply base.

The table below summarises the stage of implementation for the different applications in each case firm.

Table 2: Stage of implementation of e-procurement in case firms

E-procurement tool	**Case A**	**Case B**	**Case C**
Buying/RTP application	- Widely used - Integrated to SAP	- Main focus of e-procurement project - Integrated to SAP	- Widely used - Integrated to ERP
Supplier catalogue sites	- Used only where incentivised	- Used for supplier controlled category	- Minimal use - Some punch-out
Electronic marketplaces	- Not used	- Used to access some larger suppliers	- Used to aggregate spend with other buyers
Reverse auctions	- Limited use for tactical spend	- Limited use for 'leverage' spend	- Increasing use across segments
e-RFX	- Widely used	- Being introduced	- Widely used

5. Discussion

In this section we present some thematic findings from the individual cases, which progress towards the development of a hierarchical model for the business case. It should be clarified here that this article reports selectively on some of the findings in this project through specific research questions. The e-procurement implementation process is reported elsewhere although the article does concern itself with the outcomes of implementation, through problem factors which arose from the project roll-out. The information obtained in the interviews was supported by various company information sources, which allow us to draw useful conclusions on the issues the firms faced during the phases of developing a case and ongoing use of the applications.

From the interviews with respondents the drivers were identified which applied across the three cases and these are presented in Table 3. It was evident that the projects were primarily driven by legacy issues such as poor data and visibility of spend, targets to improve process, a need to improve compliance, and the aim of raising levels of productivity within procurement operations. In reality, data were not available in the firms against which to calculate accurate savings targets and then to measure the benefits once projects were underway. Each of the cases reveals that the firms had difficulties in achieving expected levels of process improvement, adoption and/or

integration. This demonstrates, as one respondent stated, a misunderstanding of what the technology could actually deliver. One can also derive from this that the early publicity and some of the literature on e-procurement have over-simplified the functionality and deliverables. It emerged that managers are tempted to see e-procurement as a panacea for their problems and to set unsubstantiated targets.

Table 3: Drivers for e-procurement in the three cases

	FIRM A	**FIRM B**	**FIRM C**
Optimise strategic sourcing policy	X		
Support spend savings targets	X		X
Establish common processes	X	X	X
Standard platform for managing procurement spend	X		
Knowledge sharing between BUs	X		
Move procurement managers from transactional to strategic activities	X	X	X
Improving productivity of purchasing personnel	X		
Spend compliance	X	X	X
Visibility of global spend	X	X	X
Improved supplier management and selection	X		X
Integration with suppliers	X		X
Auditable spend management data		X	X
Achieve buying leverage		X	X
P.O. cost reduction	X	X	
Efficient payment & invoice settlement		X	X
Centralise control		X	
Reduce supplier numbers		X	X
Raise standards within procurement function			X

The change management issues have been explored in the case histories and it is apparent that despite the considerable evidence that change is a key success factor in any IT-related project, firms have still to understand the complexity of this requirement. Respondents in all three firms were concerned that their failure to implement change effectively put the project at risk as savings and benefits are postponed or fail to materialise. The cases reveal that delivering the benefits of e-procurement is more problematic than any had expected. This may be due to the fact that we are dealing with a new phenomenon or that the technology is still fairly immature and subject to further refinement. However it is evident that the business case put forward can be speculative and based on false assumptions of what will be achieved through such mechanisms.

Some further important observations relate to the scope of the business case and drivers identified here. Firstly, there was little consideration of the impact on suppliers and their business. Indeed suppliers were virtually treated as willing accomplices to these implementations. There is much evidence in the literature that suppliers need to be able to benefit from e-procurement adoption and failure to offer benefits will entail resistance to the mechanism (Yen & Ng, 2002; Bartels, 2004; Quayle, 2005). In two instances the firms stated that they needed to use their major suppliers' e-procurement or ordering systems if they wanted to obtain the best terms. Second, there was no discussion in any of the firms of the wider supply chain implications of e-procurement adoption. It has been postulated that supply chain-related systems need to be evaluated in a wider, holistic sense and the business case which neglects the supply chain of trading partners (be it customers or suppliers), is inadequate as it ignores important process and productivity issues (van Hoek, 2001; Smart, 2008). Third, there was no evidence of a Total Cost of Ownership approach in the project. If suppliers incur costs through new technology adoption, total cost may be affected, unless there are corresponding improvements in process, operation cost or cycle time for that supplier. This issue was only considered in part by firm B who at the early stages of adoption, paid for some of the suppliers' costs in developing catalogues and integrating to their platform. There is evidence, particularly in relation to reverse auctions, that unhappy suppliers will indulge in retaliatory pricing against buyers (Emiliani and Stec, 2005).

The full range of issues and problems encountered by each firm in the implementation and usage phases is summarised in Table 4. These were extrapolated from the interview transcripts and verified with the respondents in the final round of interviews and discussions, as undertaken for the variables in Table 3.

Table 4: Problem factors affecting the project implementation and development

	FIRM A	FIRM B	FIRM C
Unclear original business case	X		X
Poor legacy systems and data	X	X	X
Visibility on spend not solved	X		
Need to use suppliers' systems to get best deals	X		X
Change management	X	X	
Training requirements	X	X	
Different accounting/reporting rules globally	X		
Misunderstanding of what the technology could deliver	X	X	
Finding new people with right skills		X	X
Integration to external platforms		X	
Wrong targets set initially		X	X
Re-defining task and roles	X	X	
Role of internal communications		X	X
Not possible to add all suppliers		X	
Buying systems not user-friendly	X		X
Software needs updating over time			X
Reducing supplier numbers proved difficult			X

It became clear from the interviews with respondents that the various e-procurement applications are used for very different purposes and logically have their own drivers. For example, firms making extensive use of reverse auctions are normally pursuing price reductions or exploiting excess capacity or competition in the supply market – this was evident in Case C. Use of suppliers' web sites was driven by the relative power in the relationships between buyer and seller. Firms A and C found themselves obliged to accommodate powerful suppliers in this way. In all three cases, the firms developed a

high level case for investment in e-procurement, based on overall savings exceeding cost outlays. No evaluation was conducted on how much each application individually could contribute to those savings. From these examples, it derives that firms are justifying e-procurement in a generic sense and need a clearer understanding of what the individual components of e-procurement software can contribute, within an overall business case. This would allow for more accurate measuring of benefits subsequently, and to compare the contribution or value of alternative applications. The mechanisms address different business problems and it is necessary to understand which issues in purchasing management each is designed to improve. Hence the hierarchical model introduced here offers a starting point for a case relating to the different e-procurement mechanisms, depending on the nature of the drivers in the individual firm.

6. Hierarchical framework

As illustrated in Table 3, there were eighteen different drivers identified across these three cases. The business context and internal managerial issues are likely to differ between firms, even in the same industry, yet the issues raised relate to a number of common criteria in e-procurement projects. Through discussions with the respondents, we were able to explore and categorise these drivers within the framework shown (Figure 2).

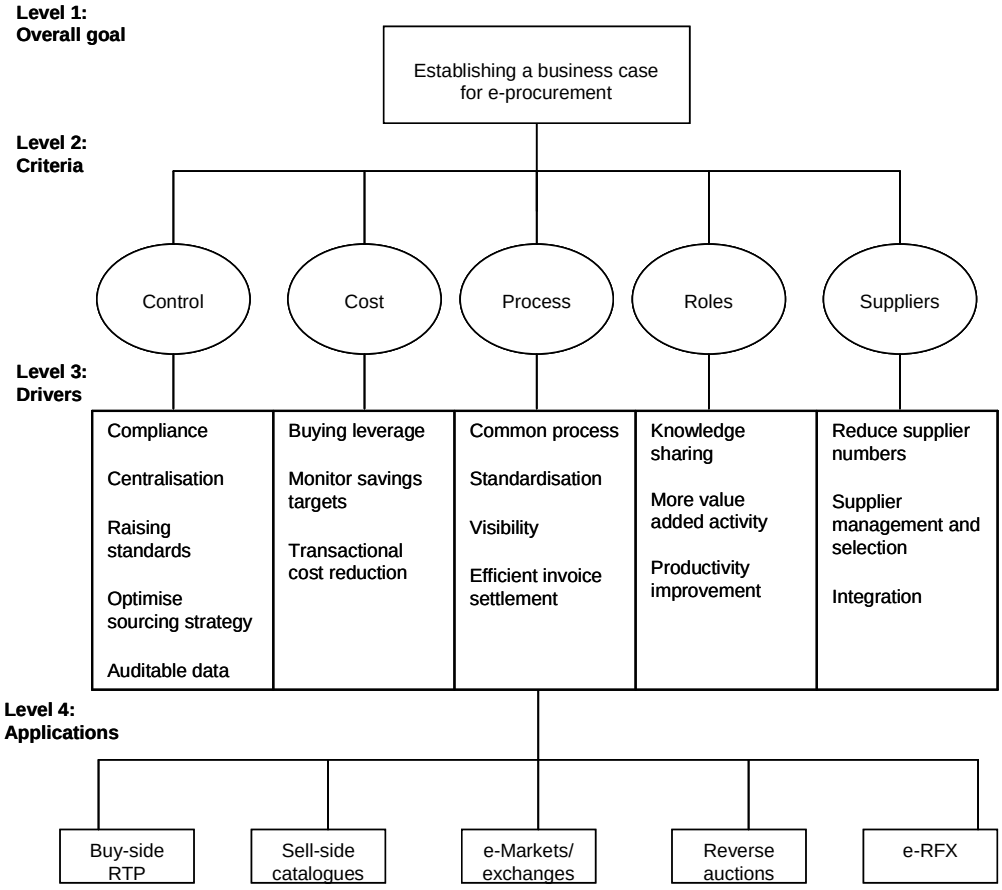


Figure 2: Hierarchical framework of drivers for e-procurement adoption

The concept of the multi-attribute hierarchy (MAH) was introduced by Min (1994) as a method of categorising variables and illustrating the relationships between them in a clear, structured format. The MAH is in turn based on multiple attribute utility theory (Green and Wind, 1973). Min (1994: 25) states "MAUT enables the decision maker to structure a complex problem in the form of a simple hierarchy and to subjectively evaluate a number of quantitative and qualitative factors". The MAH model has been adapted more recently in a case on purchasing synergy within a multi-national organisation, to structure the decision-making process (Smart & Dudas, 2006),

The hierarchy introduced here contains a number of levels, as originally formulated by Min (1994). Level one of the hierarchy shows the primary goal, described as establishing a business case for e-procurement. The second level indicates the criteria into which the drivers, shown on level three, have been allocated. This was achieved by the following process. Initially the list of drivers was created from the interview transcriptions and these were analysed in a mind map in order to create a set of logical categories. This initial draft was developed further through discussing the factors with respondents, which allowed through an iterative process for them to be classified under the relevant headings. Some of the drivers feasibly could be classified under more than one heading, however we chose the most logical based on evidence from the cases and comments from respondents. This process also allowed verification of the drivers identified and elimination of any duplicates. The fourth level in the hierarchy shows the applications available within the e-procurement domain, which can deliver solutions to the drivers in the level above.

The principle of the hierarchy is that it provides a relevant framework for interpretation of the issues faced by firms when considering e-procurement adoption. It will help to identify components of a business case, based on empirically-derived drivers, shown under key categories. This framework will assist firms in understanding these drivers for change in the procurement function and the respective criteria they address.

7. Conclusions

Most of the evidence on e-procurement, with the exception of e-auctions, has dealt with hypotheses or concepts derived from survey results. This paper has examined, through case examples, the issues faced in developing a business case and the factors during implementation and usage which support or refute that case. It is clear that even large multinational firms with significant resources are struggling to achieve the full extent of the benefits which e-procurement offers. We can conclude from the evidence reported here that the global and diversified nature of such firms is part of the problem – the lack

of audited spend data, large numbers of personnel involved and range of legacy systems in use, all complicate the fulfilment of the original drivers for the project.

Only one of the three firms here developed a quantified business case for the project, including financial measures such as return on investment and headcount reduction and this example was subsequently recognised as incomplete. The cases suggest that due to lack of empirical evidence of the success factors in achieving e-procurement, firms have taken a fairly speculative approach to the use of this technology. In effect, the temptations of visibility, compliance, integration and spend optimisation have outweighed the lack of hard evidence for the outlays involved. However that is not to suggest that these projects have been a failure: all of the firms have gone some considerable way towards achieving the targets they established. What is clear is that there are numerous obstacles in such projects to achieving in full the potential benefits which e-procurement offers.

The theoretical model elaborated in this paper and expressed as a hierarchy offers a template whereby the drivers for e-procurement can be allocated into key categories: Control, Cost, Process, Roles and Suppliers. Each of these categories impact upon the firm in different ways, are critical to success and each could be the basis for a different part of a business case. For example, the project could be divided into five segments represented by the categories, each with its own timetable, actions, allocation of personnel and supporting metrics. By identifying the relevant drivers as shown here in the hierarchy, firms can develop a business case which addresses their legacies and objectives, and which will guide them towards a more successful project outcome. It is apparent from these cases that insufficient time has been devoted to the issue of roles in particular; therefore training, communication and re-deployment of people within the resulting procurement structure, must be managed more effectively.

The problem factors identified in Table 4 will assist firms to act upon potential show-stoppers, by comprehending the issues they will potentially face, from planning, through implementation, to adoption by users. We can conclude from the case evidence that e-procurement systems will not guarantee to solve the issue of poor legacy management information. Firms need to undertake robust analysis of the tools and data capability of the applications they are adopting and a case based on a simplistic expectation of wiping clean the problems of the past is inadequate.

Establishing a case for IT investments of all kinds is problematic. Ward & Peppard (2005: 423) have stated that ‘it is often difficult to associate (IT) infrastructure investments with the subsequent benefits of using applications, even where sophisticated capital cost

recovery accounting techniques are used'. The firms investigated here had taken different approaches to justification and found that there were significant factors during or after the implementation which militated their case. This suggests firms still have much to learn about the realities of e-procurement adoption, hence case histories of the kind presented here are necessary in advancing understanding of the state of play in this emerging but important phenomenon within purchasing practice. The drivers and problem factors identified in this research, and the hierarchical framework for analysis are a step towards improving this understanding and can form the basis for further research with a wider sample of organisations.

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