

# Electronic Procurement Systems: Application and Improvement

Stewart Pedersen  
Stephen Chau

School of Information Systems  
Faculty of Commerce and Law  
University of Tasmania  
Hobart, Australia  
Email: [Stewart.Pedersen@infosys.utas.edu.au](mailto:Stewart.Pedersen@infosys.utas.edu.au)

## Abstract

*This paper is research in progress. By investigating two case studies involving the use of electronic procurement systems (EPS) by major procurers in Tasmania, the study considers how effectively contemporary EPS support the procurement process and attempts to identify possible ways in which future EPS could be improved. The research does not seek to compare the software used in the two examples; rather the research focuses on support provided in specific cases and opportunities for future improvement. An interpretivist perspective is adopted, employing qualitative data collection and analysis techniques. Initial findings suggest that the EPS in place do support the procurement process. Possible improvements such as the inclusion of electronic payment mechanisms are identified. Other significant issues, such as the need for suppliers to also be considered procurers, are also highlighted.*

## Keywords

Case study AI0102, Exploratory study AI0106

## INTRODUCTION

The procurement process links an organisation's internal customers and external suppliers in order to obtain goods and services (Gebauer and Seveg 1998). The process necessitates communication and information processing between multiple parties internal and external to the organisation (Nissen 1997).

### Suitability to Electronic Commerce

The traditional paper-based procurement methodology is characteristically convoluted, resource intensive, error-prone and expensive. The process is often repetitive, directed by a mandated set of protocols, and items involved are often not considered information intensive (Zenz and Thompson 1994). The presence of these factors indicates that the procurement process may be well suited to the adoption of computer technologies (Buxmann and Gebauer 1999).

### Procurement Costs

The cost of the traditional procurement process can far exceed the purchase price of the required item. As a rule of thumb, about 20% of an organisation's purchases constitute 80% of the total purchase value (Nam 1998). A high percentage of procurement staff's temporal resources are spent on non-value added activities such as performing data entry, correcting

errors in paperwork, expediting delivery or solving quality problems. With organisations often spending approximately one third of their overall budget to purchase goods and services, procurement holds significant business value (Kaplan 1999).

## EPS

Electronic procurement systems (EPS) utilise digital computer networks, with underlying standardised commerce protocols, to form a system of trading partner interconnectivity to support the procurement process. EPS have the potential to offer benefits through process automation, reducing errors, providing standardisation of documentation, improving communications, electronic audit trails, electronic payment systems and logistics support.

### The Internet and Electronic Procurement

Gebauer, Beam and Seveg (1999) suggest that the internet has certain advantages and disadvantages that may assist or impede the utilisation of web-based electronic procurement technologies. The following (table1) provides a summation.

Internet Characteristics To Support Procurement	Obstacles To Internet-Based Procurement
The internet users has a steadily increasing user base	A lack of critical mass in terms of trading partners
Uses for the internet, coupled with new technologies, continue to increase steadily	Lack of adequate tools and systems, such as payment mechanisms
There is an increasing number of internet-based procurement solutions available	Lack of available electronic procurement case studies for benchmarking and scrutiny
Security concerns are decreasing with the advent of new technologies	Security concerns
The internet is a cost effective alternative to traditional private value added networks	Existing legacy systems, often multiple within one organisation
Information can be transmitted in real time, regardless of geographic location	Inadequate search mechanisms
Culture change has led to the internet being increasingly considered to be a user-friendly business tool	A lack of managerial support and vision

Table 1: Barriers and accelerators regarding the adoption of the internet as a conduit for electronic procurement.

### Increasing Utilisation

Recent years have seen EPS offered by various software developers. Limited literature is available concerning how well these systems fulfil their intended function. However it is evident that the utilisation of EPS is increasing. Estimates of interorganisational commerce of tangible goods over the internet vary, but Forrester estimates that in the U.S. \$43 billion worth of goods were traded in 1998 using B2B EPS. Forrester predicts that this figure will reach \$1.3 trillion by 2003, or 9.4 percent of total business-to-business sales. Research company IDC, share a similar outlook, suggesting internet based procurement more than doubles in size each year, with a compound annual growth rate of 105 per cent (Lewell 1999).

However, it is suggested that EPS are still in their infancy (Gebauer *et al.* 1999). Given that EPS are a relatively new phenomena, this claim appears acceptable.

## RESEARCH QUESTION

There is a predicted increase in the use of EPS to support the procurement process. Considering the business value of the process, and the reported concerns over the infancy of

contemporary technology, notably the lack of adequate tools, the following research questions are proposed:

- What areas of the procurement process do the given EPS support?
- How can future EPS provide improved support for the procurement process?

## **METHODOLOGY**

This exploratory research in progress is a subset of a larger research plan investigating the use of EPS and employs a case study methodology under and interpretivist approach.

### **Research Approach**

An interpretivist approach is considered appropriate as the subjective opinions of those actually utilising a given system were required in order to address the research questions. Interpretivist researchers must share the feelings and interpretations of the subjects being studied. Numerous hours of direct personal contact may be required, as the researcher endeavours to view the issues from the subject's perspective (Neuman 1994). The variables influencing a given situation may be non-obvious, and an interpretivist approach furnishes the researcher with the range of techniques required to obtain an holistic view.

### **Case Study Methodology**

According to Yin (1994) a case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context. Case study research can involve the selection of either one single case, or multiple cases, and the same methodological framework applies regardless of the number of cases included in the study (Yin 1994).

Multiple case study is considered one of the best research techniques for exploratory purposes. Benbasat, Goldstein & Mead (1987) provide a clear rationale for the use of this approach. The authors suggest that multiple-case designs are desirable when the intent of the research is description, a characteristic of an interpretivist approach, or when theory building and testing. Multiple-case designs allow for cross-case analysis and the extension of theory. Two case studies are used in this research.

### **Data Collection and Analysis**

For the purpose of this investigation data collection is performed through a series of semi-structured and unstructured interviews and the collection of field notes. Where site visits are not feasible, due to geographic or temporal constraints, telephone interviews are used.

#### **Interviews**

McCracken (1988) and Seidman (1991) and Minichiello *et al* (1995) offer guidelines for interviewing, such as recommended length and tone, appropriate questions and the use of pilot interviews. For the purposes of this investigation a mixture of semi-structured and unstructured interviews were used. These involved open and closed questions and probes. Pilot interviews were conducted and facilitated refinement.

#### **Interview Direction**

Along with the collection of background information, the research attempts to establish:

- How procurement was performed prior to the adoption of an EPS;
- What users expected to gain from utilising the EPS, as opposed to what they actually gain;

- How the EPS supports their established procurement practices; and,
- How future EPS could be improved.

#### Field Notes

Field notes are employed throughout this research in accordance with the literature. Neuman (1994) identifies six different types or levels of field notes, all of which serve different functions. Those employed include jotted notes, which serve as memory triggers, and researcher inference notes, where the researcher makes interpretations based on observation. Minichiello, Aroni, Timewell and Alexander (1995:216) suggest that the essential function of any field note is to “...address the who/what/when/where/how questions that surround the study.”

#### Framework for Investigation

The use of a matrix, defined as “...the crossing of two lists, set up as rows and columns...” (Miles and Huberman, 1994, p.93), was employed as a framework for investigation regarding the support the EPS provides for the procurement process. Gebauer *et al* (1999) suggest that by identifying the types, uses and the value of the goods purchased, it is possible to distinguish between three categories of procurement:

- Procurement of raw material and production goods;
- Procurement of maintenance, repair, and operating (MRO) supplies; and,
- Procurement of capital goods and maverick procurement.

The procurement process itself can be modelled as having three core stages: information, negotiation, and settlement (Gebauer *et al* 1999). It is suggested that emphasising the crucial aspect of delivery, as distinct from payment, reveals a possible modification to the core set of three stages of the procurement process. Without adequate logistical control mechanisms the procurement process is impeded and without delivery financial restitution does not take place.

Thus the final stage (settlement) may be subdivided into separate delivery and payment phases, leaving a model of four stages:

- Information gathering;
- Negotiation;
- Delivery; and,
- Settlement.

Gebauer *et al* (1998) state that by combining the two dimensions (types of procurement and process stages) a matrix may be formulated which enables investigation of the given EPS. A graphic depiction of this concept is shown in Figure 1. Data analysis under this framework utilises single and cross-case analysis, allowing the researchers to find clusters of ideas and themes across cases, as well as comparing and contrasting the individual coding of each case.

In the tradition of multiple case study analysis, the first level of analysis involves examining each case separately, which leads to a detailed description of each case and the emergent patterns specific to the case (Eisenhardt 1989). The second level of analysis in multiple case study research aims towards a consolidation of each single case analysis by selecting a number of categories and looking for differences and similarities across the cases.

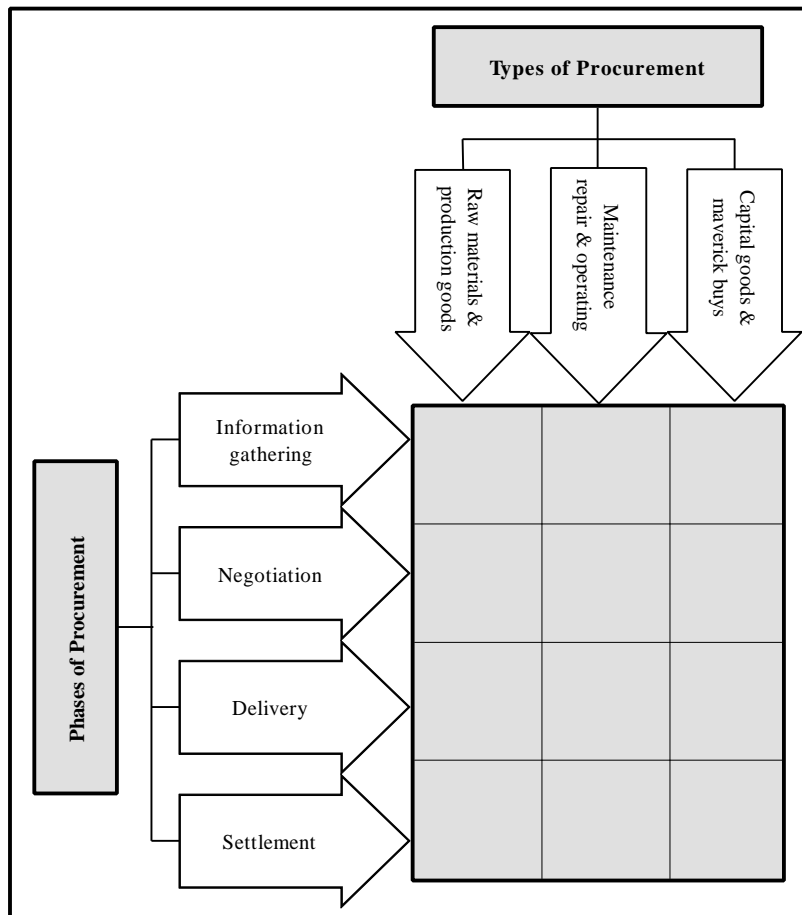


Figure 1: Framework for investigating support for the procurement process (Adapted from Gebauer *et al.* 1998).

## CASE STUDIES

Two case studies are used in this research. In both cases the EPS were implemented through projects undertaken by the Tasmanian Electronic Commerce Centre (TECC). Funding was provided by the National Office for the Information Economy's (NOIE) Information Technology Online Program (ITOL). In the first case three mining companies and a large municipal organisation form the procurer community. A transport company is also involved to provide logistical support. In terms of a trading community 98 suppliers have agreed to trial the EPS provided.

In the second case four procurers are involved, collectively accounting for a substantial portion of commercial food and beverage purchasing in southern Tasmania. There are 7 suppliers involved in this case.

The technology used in the first case is sourced from two organisations. One provides the procurement infrastructure and the other the delivery logistics. The same technology has been used in a similar project involving a mining site in mainland Australia. In the second case, a different organisation provides the procurement infrastructure. There is currently no allowance for delivery logistics in this project. This software has also been used in other Australian ventures.

In both cases the technology is web-based. Both cases require installation of software at the procurer site, but only the second case necessitates the installation of software at the supplier site, the first case being browser-based. It is reiterated that the overriding purpose of this

research is not to compare the software used in each case; rather, the purpose is to investigate which areas of the procurement function the EPS support in a given case and suggest how future EPS could be improved.

## **DISCUSSION**

The following discussion section is based upon preliminary findings.

### **Information Gathering**

In case one the EPS does assist the procurer at the information-gathering stage to the extent that they can access a list of enabled suppliers via a subscriber-only website. The list provides details of the suppliers' function and contact information with regard to purchasing electronically. This serves not only as a useful search mechanism for the procurer, but also as a form of advertising for the supplier. The information gathering stage (in terms of sourcing suppliers) is not applicable to the participants of the case two, where the procurer has pre-negotiated supplier contracts.

Buyers indicated an increased electronic supplier base would be of value. Buyers envisaged that future EPS could furnish increased benefits with the provision of relevant content, such as links to business information, at the subscriber website. Suppliers suggested they could theoretically increase sales through increased marketing if the directory was not limited to subscribers alone. Both procurers and suppliers saw potential in the use of electronic catalogues. Establishing electronic catalogues would allow suppliers to showcase their products at the same time as allowing procurers to comparison shop, and therefore strategically source, more easily.

### **Negotiation**

In terms of the negotiation stage of procurement, if we consider negotiation to be constituted of two parts, Request for Quotation and the placement of an order, both systems provide support. Procurers are able to electronically generate and transmit these documents. Technically an RFQ can also be sent for the purchase of capital goods or maverick buys.

Suppliers saw potential improvements to the negotiation stage through the incorporation of catalogues enabling different prices for different buyers (given an increased buyer base). Suppliers also indicated that in some instances, such as unloading excess inventory, an auction mechanism could be used, provided the participant base has critical mass. Buyers, in these examples, were satisfied with current provisions given that supply relationships, and price, preexisted their use of the system.

### **Delivery**

Delivery is supported by the EPS in case one. Booking requests, collection and delivery details are all catered for. The details are displayed on technology provider's website, allowing participants to access pertinent information. No logistic support is provided in case two. Both buyers and suppliers emphasised the need for integrated logistics components in future EPS.

### **Settlement**

Neither system supports the settlement phase of the business process in that no funds are exchanged electronically. However, users are able to send invoices electronically and the control mechanism within the system ensures an invoice match, reducing errors and ensuring

payment. Although current methods function satisfactorily, buyers and suppliers identified a need for integrated settlement processes.

### **Enhancing the Procurement Process**

The preliminary results of the investigation indicate that the EPS in place do support the procurement process to some extent, but they do not necessarily significantly enhance it nor do they provide complete solutions. It is noted that some of the technologies that could provide increased support for the participants, such as electronic banking, are available as add-ons. At the outset of the projects participants were made aware of the fact that although this and other technologies were not included in the initial project, the EPS in both cases do allow for the addition and adoption of other electronic commerce technologies.

### **Multi-Dimensional Process**

The current EPS appear to have the EDI characteristic of viewing the procurement process as linear and to some extent a one-way process. Suppliers suggested future EPS could be improved by considering the supplier also as a procurer. Procurers in both cases are able to raise orders on their suppliers, but suppliers themselves are not able to raise orders on their own suppliers. It is suggested that developers of future EPS recognise the androgynous nature of businesses and treat all businesses as both procurers and suppliers. Without such a vision EPS may be limited to providing benefits to procurers without due consideration of ways in which suppliers (who are in effect themselves procurers) can also leverage real benefits.

## **FUTURE RESEARCH**

It is hoped that this research will include, in time and amongst other things, information regarding the impact of EPS upon the supplier-procurer relationship. However, investigations of this kind require a longer timeframe than this subset of research allows. It will also be interesting to note any quantitative changes to such things as the frequency of orders placed by procurers, given the anticipated increase in ease with which orders can be placed.

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## ACKNOWLEDGEMENTS

The authors would like to extend unreserved gratitude to the project participants, in particular John Handsaker and John McCann of the Tasmanian Electronic Commerce Center, for providing input into this investigation. Thanks also the Dr. Paul Turner from the School of Information Systems, University of Tasmania, for his invaluable input.

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