

# **Towards a Model for Measuring the Performance of e- Procurement Initiatives in the Australian Public Sector: A Balanced Scorecard Approach**

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## ***Key Words***

e-Procurement; e-Procurement initiatives; performance measurement; Balanced Scorecard; benefits; objectives; public sector.

## ***Abstract***

Electronic Procurement (e-Procurement) has attracted major attention in recent years and a number of initiatives are already underway as part of e-Government in Australia. However, the challenge of measuring the performance of e-Procurement initiatives has received limited attention in government publications and academic literature.

This research proposes a model for measuring the performance of e-Procurement initiatives in the Australian public sector. Kaplan and Norton's Balanced Scorecard (BSC) (1996) provides a conceptual foundation for the study, which includes an organisation's e-Procurement objectives and performance measures grouped into four perspectives: Financial, Customer, Internal Business Process and Learning-and-Growth. It also proposes a

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methodology for the field research in order to formulate e-Procurement objectives and develop a balanced set of performance measures that can assess the success of an e-Procurement initiative of an organisation. The findings will then need to be verified by means of a survey of selected group of public sector agencies that have implemented e-Procurement systems.

At a time when there seems to be lack of a satisfying tool to guide the public sector agencies in their efforts to quantify e-Procurement benefits, this model is designed to provide insights to professionals and practitioners to better prepare and plan to develop and implement performance measurement systems for e-Procurement initiatives.

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## **1. Introduction and Background**

There is evidence that confusion exists in defining e-Procurement in the literature (Murray 2001; Vaidya et al. 2003; World Bank 2003). Uncertainty also exists in defining the phases of the procurement process (Vaidya et al. 2003). Should Electronic Procurement (e-Procurement) be defined as “any technology designed to facilitate the acquisition of goods over the Internet (Davila et al. 2003), or as the “electronic management of all procurement activities” (BuyIT, 2002)? Perhaps it is a “marriage of strategic sourcing and an electronic procurement tool” (NECCC 2001).

However, the definition presented by the World Bank is more precise in both respects. It has categorized the term “Electronic Government Procurement” (e-GP) in three levels (World Bank 2003). While the second-level definition distinguishes between e-Tendering and e-Purchasing and the third-level definition covers the basic steps as part of the e-Tendering and e-Purchasing process, the first-level definition states that “e-GP is the use of information & communication technology (especially the Internet) by governments in conducting their procurement relationships with suppliers for the acquisition of goods, works, and consultancy services required by the public sector” (World Bank 2003). As such, this paper will use the first-level definition in order to avoid confusion.

To further clarify the “first-level” definition, e-Procurement or electronic commerce for procurement is the use of electronic technologies to streamline and enable the procurement activities of an organisation. It is the term used to define the set of technology solutions which are used to support and enhance purchasing processes such as e-Tendering, e-Auction or Reverse Auction, e-Catalogues, e-Marketplace and e-Invoicing. Again, there is confusion to term these e-Procurement solutions. The terms such as ‘forms’, ‘approaches’, ‘modules’, ‘models’ and ‘components’ have been used in the literature to refer to individual applications (tools) of a full (end-to-end) e-Procurement system (Vaidya et al. 2003). Though there is some overlap, each of the e-Procurement tools concentrate on different key areas of procurement:

sourcing, managing, ordering and paying (NEEP 2003). Again, corresponding to “first-level” definition as stated in the above paragraph, this paper will refer to the full (end-to-end) e-Procurement system rather than any specific e-Procurement tool.

Having identified the location of the definition of e-Procurement in this paper, the remainder of the paper will cover seven major elements. First, Section 2 reviews prior research on e-Procurement and discusses the current state of research on e-Procurement performance measurement in the Australian public sector. Second, Sections 3 & 4 establish the need for measuring performance of e-Procurement Initiatives and describe the theoretical framework used in this paper. Third, Section 5 gives an example of e-Procurement strategy implementation objectives and links the objectives to benefits. Fourth, Section 6 reviews case studies of major e-Procurement initiatives in Australia and attempts to identify the benefits of e-Procurement adoption within the case studies.

Fifth, Section 7 identifies benefits of e-Procurement in terms of quantitative measures for each objective from section 5. Sixth, in Section 8 the BSC model (Kaplan & Norton 1996) of measuring e-Procurement performance is introduced in detail and discussed as a research approach planned for adoption in field research in this area. The paper concludes with the discussions of the limitations of the research and its implications for e-Procurement professionals in the public sector.

## ***2. Current State of Research on e-Procurement***

A limited analysis of the success of e-Procurement can be found in recent academic and trade articles. The typical focus includes an evaluation of the value of e-Procurement (Subramaniam 2003); issues related to measuring e-Procurement benefits (BuyIT 2002); the impact of e-procurement (Segev et al. 1998); adoption of e-Procurement models (Davila et al. 2003); and explanation of e-procurement business cases and phases of e-Procurement system development cycle (DPWS 2002; OGC 2002). Much practitioner

literature comes from the IT/Business management companies and e-Procurement solution providers who explain the benefits to be achieved after implementation of the particular solutions available in the market. While a few publications discuss “what to measure” and “how to measure” (DOF 2002; BuyIT 2002; OSD 2001, CGEC 2002), very few have taken an academic research approach on e-Procurement performance measurement. A recent article in this regard (Vaidya et al. 2004) reviews the assessment/evaluation reports of eight major public sector e-Procurement initiatives in Australia, the UK and USA and identifies eleven critical success factors (CSFs).

Some examples of attempts to undertake procurement performance measurement in the Australian public sector are worth mentioning. The NSW Government Procurement Council’s Assessment Methodology (GPC 2003) advises government agencies in New South Wales to develop an e-Procurement strategy, including performance targets and measures, and link these to procurement objectives. Unfortunately, the methodology focuses only on traditional procurement planning and the template developed by the Council is also silent on what agencies should measure in regards to the performance of e-Procurement initiatives. However, the document suggests few measures to benchmark both the processes and value for money (VFM) in procurement.

In this regard, the NSW Government has developed the “Procurement Capability Tool” that provides agencies with a checklist of questions to assess their level of procurement capability. The tool, which is mainly based on the EFQM (European Foundation of Quality Management) Excellence Model (EFQM 1999), does not seem to have addressed either the “e” aspects of procurement or the overall e-Procurement initiative. Despite the proposed actions of the “Electronic Procurement Implementation Strategy” (DPWS 2001), that the government will “identify by December 2002, benchmarking and performance indicators on which the progress of e-procurement take up can be measured”, limited progress seems to have occurred, beyond some suggesting for areas of review under the “Electronic Procurement Implementation Strategy Guidelines (DPWS 2002).

In Victoria there have been three external reviews within the last six years. Additional to this, a conceptual whole-of-government procurement performance assessment framework has been utilised by the Victorian Government Procurement Board (VGPB) since its inception in 1995. This framework is designed to measure the condition of the procurement function within the Victorian Government in terms of efficiency, effectiveness and efficacy (VGPB 1999). Although the Victorian Government developed a Purchasing Information System (PURIST) in 1995 in order to gather and report purchasing information, data captured by PURIST was limited to the transactional level and its relevancy appears to have been superseded by new initiatives such as Electronic Commerce for Procurement (EC4P). Similarly, procurement measurement initiatives of other states of Australia (Western Australia, Queensland, South Australia etc.) are worth considering. However, most reports lack an e-Procurement focus. It is important that the performance measures should not be seen only as a record of results achieved, and it is equally important that they be used to indicate the expected results.

Although there have been some developments in this area, the current state of e-Procurement performance measurement research on e-Procurement adoption is somewhat fragmented. By combining and organizing the (preliminary) findings of earlier studies (Vaidya et. al, 2003; Vaidya et. al, 2004), in this paper, an attempt has been made to identify the benefits of e-Procurement implementation in terms of quantifiable performance measures and develop a new model using the BSC approach.

### ***3. The Need for Measuring Performance of e-Procurement Initiatives***

In its simplest sense, e-Procurement performance measurement is an iterative process that focuses on the key drivers of e-Procurement, established around e-Procurement strategies and business cases. For example, what are the

Critical Success Factors (CSFs) of an e-Procurement initiative? Furthermore, within each CFS, what performance measures can be identified?

From the project management sense, public sector organizations may be measuring the progress of e-Procurement initiatives in terms of milestone achievement. However, research reported by BuyIT (2002) argues that relatively few organizations are accurately monitoring the benefits achieved as a project progresses. e-Government strategies that do not set clear and measurable objectives for constituency services, operational proficiency and political return have been estimated to have a 70% chance of failure (Maio et al. 2000). To support this notion, a research report commissioned by the Victorian Government states that “without a formal regime that includes measurable outcomes, metrics, baselines, and accountabilities, some of the planned benefits from implementing the Government Online Strategy may be at risk” (DMR 2003). This may hold true in the case of e-Procurement initiatives as well.

From the procurement management sense, performance measures are needed to determine how effective e-Procurement policies and practices have been to meet the stated objectives. If e-Procurement systems are to achieve their potential to add value to budgets and help develop local industry, there should be wider discussion and agreement on what the benefits are and how the benefits can be quantified in terms of performance measures. It is difficult to demonstrate accountability and make improvements without performance measures (AMS 2003) because measurement is the key to making the change a success. Effective delivery of the e-Procurement business case depends on the continuous measurement of the key benefits (OGC 2001). Furthermore, good measurement systems with appropriate benchmarks are important components of any reform program to identify potential areas for enhancement (APCC 2003).

#### **4. The Balanced Scorecard (BSC) Approach**

The Information Systems (IS), Information Technology (IT), e-Commerce, e-Business and procurement literature on performance measurement provide many moderating metrics that can contribute to the selection of appropriate e-Procurement performance measures. These metrics can be broadly matched to the four perspectives of the Balanced Scorecard – financial, customer, business process and innovation, and learning (Kaplan and Norton 1996). As the main objective of the BSC is the consistent transformation of strategies into objectives and measures, the application of the BSC to an e-Procurement initiative leads to the identification of the expected benefits of e-Procurement implementations, which is otherwise not necessarily existing.

When it comes to measurement of the performance of an e-Procurement initiative and e-Procurement benefits in the public sector, few methods have been identified. Those that exist tend to focus on only a single perspective of finance and ignore other important perspectives. Furthermore, traditional measures fail to address e-Business models and the needs of electronic environments (Vaidya et al. 2002). Most measures are lagging indicators (outcomes oriented) rather than leading indicators (outputs oriented). While measuring only the financial approach may be suitable for private sector as profit is, arguably, the predominant goal, the same single-focused approach cannot be applied as the only measure for the public sector. A more balanced measure of the benefits and progress of an e-Procurement initiative is necessary. This will enable a public sector organization to ensure that e-Procurement strategy implementation objectives are being fulfilled and support the broader objectives of government agencies in terms of their requirements for transparency, accountability and probity (Callender and Schapper 2003).

The BSC model (Kaplan & Norton 1996) has been adapted for IT/e-Commerce measurement over the past few years (Vaidya et al. 2002). Some major adaptation attempts included “BSC for the IT function” (Grembergen and Bruggen 1997), “IS Scorecard” (Martinsons et al. 1999) and the “e-

Commerce Scorecard” (Hasan & Tibbits 2000). Another recent attempt at adaptation is the generic “e-business scorecard” (Grembergen and Amelinckx 2002) which consists of four perspectives: customer orientation, business contribution, operational excellence, and future orientation. Furthermore, Vaidya et al. (2002) adapted the Scorecard for e-Procurement applications. Their preliminary “e-Procurement scorecard” consists of six perspectives: Transactional Efficiency and Value for Money (VFM), Buyers and End-Users, Suppliers and Relationships, Business Processes and System Support, Transparency and Competition, and ICT adoption and Integration. Vaidya et al. (2003) reviewed the literature on e-Procurement performance measurement and presented a list of e-Procurement factors and measures that impact performance. Their investigation revealed Value for Money, customer/supplier satisfaction, system interoperability and integration, change management, quality and transparency of the business process, and management information as the major factors relating to the performance of e-Procurement initiatives.

A number of authors have demonstrated different perceptions of applying the BSC approach to evaluate IS and e-Commerce systems. Martinsons et al. (1999) describe BSC as an action-oriented system whereas Olve et al. (1999) call it a goal-oriented system. BSC attempts to evaluate managerial activities with unbiased viewpoints by evaluating the integrated domain of business and technology (Martinsons et al. 1999) and customer satisfaction (Grembergen & Amelinckx 2002). For these reasons, it seems to be reasonable to apply the BSC approach to the measurement of e-Procurement performance because it also requires the integration of similar domains.

### ***5. Objectives of the e-Procurement Implementation Strategy***

The purpose of performance measurement is to measure, as objectively as possible, how the public sector agency is accomplishing the goals or objectives of its e-Procurement initiatives. Having emphasized the importance of strategy in the BSC approach, this section attempts to derive key factors inherent in the objectives of the strategy that can ultimately be transformed to

measurable benefits using tools such as the NSW Government's Electronic Procurement Implementation Strategy. The key objectives of the Implementation Strategy are to achieve (DPWS 2001) (emphasis added):

- Better *value for money outcomes* for Government on its \$10 billion annual expenditure
- *Reduced cost* of doing business for both government and industry
- Reduced duplication and more *efficient purchasing* within and between agencies and service providers
- Increased ability to capture *strategic information* and data on procurement including purchasing patterns
- *Greater access* for regional and small to medium enterprises

The section below will discuss the emphasized points in further detail and attempt to link these benefits to objectives and further sections will present the performance measures for the benefits.

### **5.1 Value for Money outcomes**

Securing value for taxpayers from this spend is clearly key concern. Implementing e-Procurement initiatives seem to deliver a significant contribution to this end.

One of the main objectives of governments is to demonstrate the achievement of VFM in procurement (DPWS 2002; DPWS 2001; Europe Economics 2001; DOF 2001). Their concern should be to extract the variables of the e-Procurement system that contribute to VFM in procurement. VFM in this context is defined as "the optimum combination of whole-life cost and quality (or fitness for purpose) to meet the user's requirement" (Europe Economics, 2001). Theoretically, if a centralized e-Procurement system is applied to a government agency, VFM, and overall internal control, may be maximized by increasing the level of on-contract expenditure both within and across agencies (DOF 2001), by increasing agency compliance with contracts established under government policies (OGC 2002). The e-Procurement tools

can also facilitate assessment of VFM by providing internal process efficiencies, freeing up staff time to be spent on value-add activities (OGC 2002), and through aggregation of across-government contracts ensuring that volume discounts will be obtained (OGC 2003).

Improved project management is another benefit of e-Procurement (DPWS 2001). Considering the “whole life cost” of the e-Procurement initiative, it can be argued that an element of VFM can also be achieved by reducing the Total Procurement Cost (TPC) of a project and by assessing the progress of the initiative in relation to budgeted expenditure (ROI) (OSD 2001). It is, therefore, important to associate the performance measures of the e-Procurement project itself to VFM improvement.

## **5.2 Reduced cost**

The benefit of cost reduction through the implementation and deployment of the e-Procurement system can be related to Return on Investment (ROI) measures in the public sector. Although the term “Appropriation Efficiency Factor” has been coined as the public sector equivalent of e-Procurement ROI (AMS 2001), the term does not seem to be widely cited in the literature (e.g. Vaidya et al. 2002).

Of course, a value-added service revenue model may not be relevant to all public sector agencies because the funding models apply only to a “whole-of-government” approach to e-Procurement initiatives which are being developed in some States of Australia. However, a reduction in procurement processing time and cost and also the reduction in cost of goods and services procured will have a direct impact on ROI (OSD 2001; BuyIT 2002) although this may be measured differently in public sector agencies. For example, a reduction in processing time through the transformation of paper-based process to online transactions should result in a reduction in processing costs. Furthermore, the ability of the e-Procurement system to consolidate procurement volumes over time contributes to the reduction of cost of goods and services (OSD 2001;

OGC 2002; DPWS 2001) and thus the Total Cost of Ownership (TCO) (CGEC 2002).

### **5.3 Efficient purchasing**

Apart from the cost reductions arising from transactional and price benefits that directly impact ROI, e-Procurement can also contribute to efficient purchasing process in many other indirect ways. As the workflow automatically routes information through the purchasing process without the need for data re-keying, the user can complete a requisition very quickly, easily and with a minimal amount of data entry (OGC 2002). Reducing duplication reduces error rates and improves efficiency throughout the purchase to pay process. Streamlining of the internal processes enabled by e-Procurement results in improved delivery times, flexibility and reduction in process cycle times (NOIE 2000). Use of e-Procurement systems also offers increased ability to search for products and services, automated reordering systems, and access to a wider range of service providers (DPWS 2001). Thus, it can be said that the ease of use, system availability and user friendliness together can contribute to positive user satisfaction.

### **5.4 Strategic information**

Management Information (MI) can be extracted from the e-procurement system using standard reporting software (OGC 2002), which makes the data collection process transparent. This transparency makes it possible to identify non-conformance and identify the necessary corrective action and improves ability to enforce compliance with procurement policy and procedures (DOCITA 2000; OGC 2002). Sharing and analysis of procurement information (NOIE 2000; OSD 2001) facilitated by e-Procurement enables a more accurate estimate of the total spend on goods and services for a contract duration using actual historical spend data. Thus, both the better estimation and user compliance give suppliers confidence that promised order volumes will be achieved (OGC 2002). In addition to contract compliance by the users, MI provided by e-Procurement also enables to monitor compliance with

Service Level Agreements (SLA) and measure supplier performance (OSD 2001).

An e-Procurement system has the potential to provide better procurement information (DOCITA 2000) by means of various customized reports allowing a complete visibility of the history of a transaction, automatically recording the 'who', 'when', 'what' and 'where' of every data entry on the system (OGC 2002) of all purchasing activity and can reveal issues such as duplicated contracts, off-contract spend, and total spending patterns (NEPP 2003; DPWS 2001). This enables management to better understand specific or critical issues in regards to procurement planning and have informed input into decision making processes (DPWS 2001). In summary, management information that can be extracted from the e-Procurement system improves transparency, employee accountability, compliance, SLA monitoring and supplier performance measurement, which in turn, contribute to value for money improvement.

### **5.5 Greater access**

It is obvious that e-Procurement greatly helps improve communication with suppliers providing access to the latest information 24 hours a day, 7 days a week. Thus the maximum systems availability makes it easier for businesses to obtain tender documentation and to submit an offer. The general ease of information flow afforded by the Internet can help overcome many of the problems of geographic isolation (DPWS 2002) which can promote competition.

Although there seems to be a tension between "Buy Local" policies to boost the local economy and efficiencies to be achieved through purchasing from large suppliers (AGV 2003), this type of tension can be resolved by other Government initiatives to help the regional and small businesses with the development and maintenance of their e-Catalogues in order to ensure equality of access. So, it can be said that enabling the suppliers with e-Commerce capability not only improves supplier relationships but also

contributes efficiencies on the supply side reducing the suppliers' process costs (OGC 2002), which in turn, helps achieve the local and regional economic development.

## ***6. e-Procurement Initiatives in the Australian Public Sector: A Review of Case studies***

As noted by Tonkin (2003), "delivery of government services online and the conduct of government to business transactions electronically is considered self evidently beneficial" and e-Procurement initiatives in the Australian public sector are implemented in the absence of baseline data on benefit measures. However, some public sector agencies and initiatives seem to have experienced some of the benefits discussed in the above section.

The table below (Table 1) briefly depicts the details of the case studies and initiatives that are publicly available and their source.

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**Table 1: e-Procurement initiatives in the Australian public sector**

Agency/ Initiative	Description	Source/s
NSW Health	Being a "Whole of Government" strategy developed and proposed by the NSW Department of Public Works and Services (now Department of Commerce), the NSW Tendering System was implemented and adopted by the NSW Health Peak Purchasing Council (HPPC). The system is now operational.	NSW Health (2002), AO (2002)
SmartBuy	Launched in November 2002, Smartbuy is a comprehensive, easy-to-use and robust e-Procurement tool of NSW Government with a full 'purchase to pay' process.	SmartBuy (2003)
Sydney Water	In 2001 Sydney Water undertook a major review of all its strategic procurement activities and processes. Electronic tendering in Sydney Water was implemented in a staged manner and it is undergoing into more advanced phases.	Burgo (2002)
CETS (AusTender)	The second phase of the Commonwealth Electronic Tendering System (CETS II) provides the three main functions of: advertising and publishing requests for tenders (RFT) for the Commonwealth Government; lodgment of responses to RFTs; and a tender process.	NOIE (2003)
EC4P	First commenced in Victoria's Department of Natural Resources and Environment (DNRE) in 1997, established in 1998 and re-launched in 2000, the Electronic Commerce for Procurement (EC4P) Project has been able to reduce its average transaction costs from \$66 to \$16 per transaction through its web-based procurement.	AGV (2003)
AFFA	In April 2001, Agriculture Fisheries and Forestry Australia (AFFA) selected <a href="#">Qvalent's</a> Procurement as a tool for 'simple procurement' and the 'proof of concept' phase was started involving selected Canberra office and NSW office staff and three suppliers.	NOIE (2002a)
e-Purchase SA	The South Australian Government's Department for Administration and Information Services (DAIS) staged the implementation of an electronic commerce purchasing system called e-Purchase SA in TAFE (SA). The trial commenced in July 2001.	NOIE (2002)
ACT Schools	The ACT Department of Urban Services was given approval by the ACT Government in 2000 to conduct an e-Procurement trial which commenced in 2001.	NOIE (2002)
GEM	GEM Purchasing E-Procurement Business System commenced in 2000 in Western Australia with the help of Sun Microsystems. It deals with all aspects of procurement in an 'end-to-end solution – e-Catalogues, quotations, approvals, ordering, payment and receipting.	AOT (2003)
DPAC	Tasmanian Department of Premier and Cabinet's e-Procurement Pilot Project was established in October 2000. Department of Education, Department of Primary Industries, Water and Environment were the agencies who participated in the pilot.	S&A 2003
AAD	Australian Antarctic Division (AAD) investigated the use of Tasmania Business Online (TBO) as its e-marketplace for the procurement of goods of services and started submitting orders via the marketplace from 2001.	(S&A, 2003)
Centrelink	As a part of its overall e-Procurement strategy, Centrelink chose to use Westpac B2Buy, an online marketplace powered by Qvalent.	Qvalent (2002?)

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Section 5 discussed the benefits that can be realised by the public sector from the implementation of the e-Procurement initiatives. Though the objective can be to achieve all the benefits including the ones discussed in the section, table 2 presents the identified perceived benefits by case studies/initiatives.

**Table 2: Benefits perceived by the case study agencies**

Benefits	NSW Health	Smart Buy	Sydney Water	CES	EC4P	AFFA	TAFE (SA)	ACT Schools	GEM	DEPAC	AAD	Centre Link	No. of Citations
Improvement in supplier relationships	x	x		x		x			x	x	x		7
Greater purchasing efficiencies		x			x	x	x		x	x			6
Process efficiency			x	x	x			x			x	x	6
Cost reduction (processing)		x		x	x	x						x	5
Compliance	x	x			x				x	x			5
Improving accountability	x			x	x					x			4
User friendliness					x			x		x			3
Transparency					x			x					2
Management information	x									x			2
Fast					x		x						2
Improved inventory management		x					x						2
User satisfaction	x												1
Promotion of competition		x											1
System availability				x									1
Flexibility				x									1
Reduction in error					x								1
Ease of use												x	1
System reliability								x					1

Apart from these initiatives, there are several other agencies that have adopted e-Procurement although case studies and detailed initiatives relating to adoption and perceived benefits have not been publicly available. Some of these include:

- Queensland Government Electronic Marketplace (QGEM)
- Department of Prime Minister and Cabinet (Westpac B2Buy marketplace)
- Department of Defense (building e-Procurement capability with the help of IBM)
- Victoria Police (EC4P)
- CSIRO (with the help of Acumen Alliance)
- Australia Post (CorProcure Marketplace)

Table 2 reveals that realization of e-Procurement benefits is not uniform across the agencies and only those benefits which are relatively easier to measure have been realised. Benefits such as improvement in supplier relationships, purchasing and process efficiencies, cost reduction and compliance benefits have been realised by most agencies/initiatives, whereas system performance benefits such as system flexibility, system availability, ease of use and reliability have been realised by least agencies/initiatives. Similarly, agencies/initiatives with greater scope such as EC4P, SmartBuy and DPAC have been able to realize the most benefits whereas Sydney Water, Centrelink and TAFE (SA) have realised the least number of benefits. It can be said that most e-Procurement initiatives in the Australian sector are in early stages of their implementations and the importance of measuring both tangible and intangible benefits cannot be underestimated as the initiatives progress.

### ***7. Adaptation of BSC to measure e-Procurement Performance***

Having derived the major benefits from the objectives of e-Procurement strategy implementation in NSW as an example, this section attempts to quantify the benefits in terms of performance measures for each of these objectives and link these to a modified BSC model. Taking account of the

progress of the e-Procurement initiative, the original BSC has been adapted in order to add the fifth perspective: project perspective.

As discussed in Section 6, there are numerous benefits to be achieved from e-Procurement adoption. However some benefits are seemingly valued more highly than others and some benefits are indirect and thus can not be realised readily. Returning back to the e-Procurement strategy implementation objectives in Section 5 and discussions of the benefits as presented in the Sections 6 and 7 and also drawing from the literature, the tables below (Tables 3, 4, 5, 6 & 7) provide some performance measures for each objective. The benefits and the performance measures are grouped to fit into the five perspectives of the modified BSC.

## 7.1 Financial Perspective

Table 3: Financial perspective

Objectives	Performance measures
<i>Value for money outcomes</i>	ROI (OSD, 2001; DPWS, 2002) Unit cost reduction (DOF, 2001)
<i>Reduced cost</i>	Total Procurement Cost (DOF , 2001; Subramaniam and Shaw , 2002),
<i>Efficient purchasing (system)</i>	Real time financial data availability
<i>Strategic information</i>	% of savings due to MI (OGC, 2002)
<i>Greater access</i>	Level of economic development perceived by suppliers % of purchases from SMEs/indigenous businesses

## 7.2 Customer Perspective

**Table 4: Customer perspective**

Objectives	Performance measures
<i>Value for money outcomes</i>	% of Customer satisfaction (OSD, 2001) % of supplier performance Level of perceived employee accountability
<i>Reduced cost</i>	% of contract compliance
<i>Efficient purchasing (system)</i>	System availability ( average uptime) System reliability Effectiveness of Helpdesk (OSD, 2001)
<i>Strategic information</i>	Level of accountability
<i>Greater access</i>	% of supplier satisfaction # of suppliers

### 7.3 Internal Business Process Perspective

**Table 5: Internal Business Process perspective**

Objectives	Performance measures
<i>Value for money outcomes</i>	Efficiency (IDB, 2002) - Average time taken to complete a bidding process - Average cost of a bidding process - Percentage of bidding exercises declared void - Standardisation of bidding procedures - % of unit costs of goods and services impacted by inflation
<i>Reduced cost</i>	% of transaction cost savings % of savings in inventory and reduced duplication % of reduction of error % of maverick spending reduction Reduced order fulfillment time
<i>Efficient purchasing (system)</i>	Level of SLA compliance Level of technical development and rollout achieved
<i>Strategic information</i>	Level of effective communication achieved
<i>Greater access</i>	Level of supplier participation

### 7.4 Project Perspective

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**Table 6: Project perspective**

Objectives	Performance Measures
<i>Value for money outcomes</i>	Total cost of ownership
<i>Reduced cost</i>	% of milestones (goal) achieved (DPWS, 2002) # of e-Procurement tools # of e-Procurement practices applied (DPWS, 2002)
<i>Efficient purchasing (system)</i>	Level of SLA compliance Level of technical development and rollout achieved
<i>Strategic information</i>	Level of effective communication achieved
<i>Greater access</i>	Level of supplier participation

## 7.5 Learning and Innovation Perspective

**Table 7: Learning and Innovation perspective**

Objectives	Performance measures
<i>Value for money outcomes</i>	Transparency (IDB, 2002) - Level of access to public information - Level of facilitation of competition - Average # of valid bidders per bidding process - Ratio of best offer/price - % of challenging and suspended processes
<i>Reduced cost</i>	% of functionality implemented within phased budget (OSD, 2001)
<i>Efficient purchasing (system)</i>	# of issue resolution # of customer complains # of new joining buying agencies % of spend processed through the system # of users actively using the system (OGC, 2002)
<i>Strategic information</i>	Level of supplier data capture for management reporting (OGC, 2002)
<i>Greater access</i>	Level of supplier e-readiness Level of Supplier training # of suppliers participating # transaction per supplier

### 8. Future Research Approach and Models

The most important development principle is that an e-Procurement BSC should contain cause-and-effect relationships. The measures selected for the e-Procurement BSC should be elements in a chain of cause-and-effect relationships. Besides the design of adequate indicators for every perspective, the linkage of the five perspective and measures in cause-effect relationships is an innovative aspect of the Balanced Scorecard (Kaplan and Norton 1996). This means that an e-Procurement BSC needs a mix of outcomes and performance drivers. While outcome measures reflect the common goals of many strategic objectives, the performance drivers are the measures that are unique for a particular procurement unit or an e-Procurement initiative.

Fig. 1: A Proposed BSC model of e-Procurement performance measurement

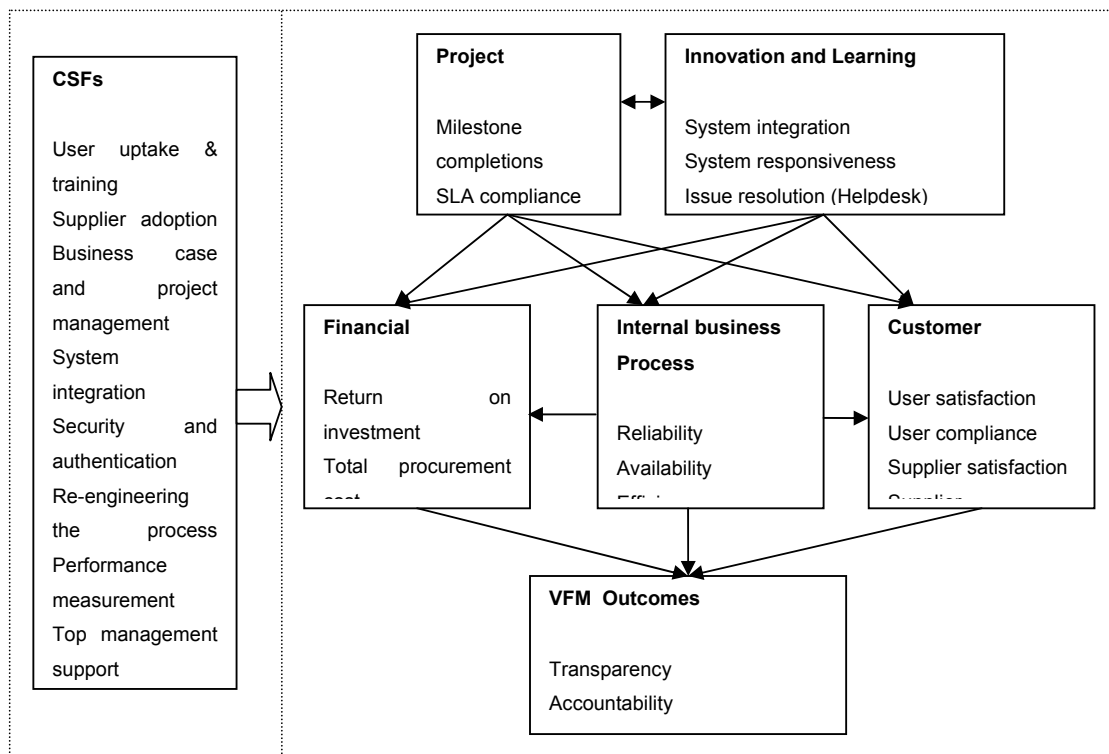


Figure 1 presents a BSC model of e-Procurement performance measurement which can represent such “cause and effect” relationships. Based on the literature discussed in Section 5, VFM is shown to have an impact on the elements of the five perspectives. Following the BSC philosophy, the model has been shown to incorporate Critical Success Factors (CSFs) for the

implementation of an e-Procurement initiative. For this purpose, a recent CSFs model of the implementation of an e-Procurement initiative in the public sector (Vaidya et al. 2004) has been interrogated to create a modified BSC model of e-Procurement performance measurement.

Future research plans will be directed in attempting to use several public sector agencies that have implemented e-Procurement systems as research fields for this study. Interviews will be conducted to solicit the opinions of each e-Procurement project manager on CSFs, e-Procurement strategy implementation objectives and performance measures. This information will be used to refine the findings obtained from the literature review on e-Procurement CSFs and performance measures within the five perspectives of the BSC. In the second phase of the research, group sessions of the e-Procurement project teams will be conducted in each agency with the help of an instrument (Decision Support Systems such as TeamEC) for brainstorming purposes in order to identify their e-Procurement implementation objectives grouped with respect to the five perspective of the BSC. Information collected through the literature review and interviews will be analysed, aggregated and presented at these group sessions of the e-Procurement project teams who will prioritize the CSFs and select the most important sets of e-Procurement performance measures. The analysis and aggregation of the information will also be used to further refine and validate the BSC model of e-Procurement performance measurement.

In order to generalize the research findings and test the model, it will be necessary to identify and survey public sector agencies that have implemented e-Procurement systems. The aim of the survey questionnaire will be to verify the findings of the field research and to solicit additional information on how other agencies measure the performance of their e-Procurement initiatives. This additional instrument will allow the research to explore, empirically, whether the users of public sector agencies who have been adopting e-Procurement agree or disagree with the findings of the field research. It will also allow the researchers to determine the effectiveness of the Balanced Scorecard (Kaplan and Norton 1996) as a framework for

developing a balanced set of e-Procurement performance measures in the public sector.

## **9. Conclusions and Discussion**

This paper identified and briefly reviewed 12 case studies and initiatives within the Australian public sector and also identified the key benefits perceived by the agencies. Although agencies did not appear to have taken operational measures and baseline data to determine the financial benefits including ROI, the benefits perceived by the agencies that have implemented e-Procurement are encouraging to other agencies that have adopted a “wait and see” in relation to e-Procurement.

This paper has also shed some light on the performance measurement of the e-Procurement initiative in the public sector using the Balanced Scorecard approach. Using the NSW Government’s e-Procurement Implementation Strategy objectives as an example, the paper derived the key benefits for each objective and grouped the performance measures of those benefits into the five perspectives of the adapted BSC. Following the discussions of the performance measures in the literature and drawing from the recent research on CSFs (Vaidya et al. 2004), this paper attempted to develop a BSC model of e-Procurement performance measurement.

The e-Procurement performance measurement is the iterative process that assesses the effectiveness of e-Procurement initiatives. The iterative process continues until the current e-Procurement initiatives activities turn out to be effective. This study should give further insights into e-Procurement implementations and help public sector managers to manage their e-Procurement initiatives. However, it should be noted that the BSC model is not a prescriptive measurement framework. Instead, it is a framework – a tool – which can be used by the project management teams to influence their thinking about the key perspectives to be addressed to manage their e-Procurement projects. The study may also provide some insights for senior

management involved in the e-Procurement initiatives to anticipate what might go wrong and to identify the elements of improved performance.

The potential e-Procurement benefits are there to be realised, as long as the CSFs are identified and performance is measured. Although this paper is not about the typical Balanced Scorecard application (Kaplan and Norton 1996), this approach has been chosen because it helps transfer strategic objectives into performance measures and addresses the Critical Success Factors (CSFs). Furthermore, this study revealed that it may be possible to take full advantage of the e-Procurement system itself to measure e-Procurement performance. Process and performance improvements are more likely to occur when measures are established, tracked, and monitored. The automated data and Management Information that can be extracted from the e-Procurement system can greatly help track and monitor the post-implementation progress of the e-Procurement initiative.

This study has some limitations. The case studies and initiatives were gathered from various websites and their credibility and the current state of implementation could not be assured. Some of the initiatives may have become fully matured by the time of writing of this paper and it is possible that the agencies may have achieved greater benefits. Similarly, the review of each case and initiative and the example of NSW e-Procurement implementation strategy objectives are quite brief in order to derive the typical benefits in detail. Furthermore, undertaking interviews and identifying research fields for this proposed study will also depend on senior management commitment to the Performance Measurement project in the public sector agencies and the ability of the e-Procurement initiative team in each agency to work collectively toward the development of a balanced set of e-Procurement performance measures.

At a time when there seems to be lack of a satisfactory tool to guide public sector agencies in their efforts to quantify e-Procurement benefits, this study has provided public sector agencies with a simplified model to measure e-Procurement performance. This study is timely as Australian governments

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address procurement reform within their jurisdiction. The model aims to provide insights for procurement professionals and practitioners to better prepare, plan, develop and implement performance measurement systems within their e-Procurement initiatives.

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