EXPLORING THE STATUS OF E-PROCUREMENT: A CASE OF THE CONSTRUCTION INDUSTRY IN SRI LANKA

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ABSTRACT

Information Technology has radically changed the way most businesses operate in recent past. Certain inefficiencies of traditional procurement processes and cycles have been eliminated through the introduction of network based electronic procurement systems. Thus, the emerging concept of e-procurement is currently being applied in almost all types of procurement. Construction industry is no exception, which has attempted to adopt these latest technologies in its procurement process. Despite the wealth of merits of e-procurement, the practice of e-procurement in Sri Lankan construction industry is still in its infancy. Thus, this study aims to investigate the current status of e-procurement including the barriers and drivers to e-procurement in Sri Lanka. Literature review identifies an extensive range of aspects with regard to e-procurement both locally and globally. A questionnaire survey was used as the mode of data collection and fifty professionals from both private and public sector involved in construction were surveyed to ascertain their views on e-procurement. Findings of the study revealed that reduction of paper work and administrative and process cost saving were the key drivers whereas lack of policies, expertise, regulatory bodies and legal challenges were the key barriers for e-procurement in Sri Lanka. These results are confined to certain limitations where construction professionals selected were from the highest ranking construction consultancy and contractor organizations within the Colombo Metropolitan region. The study enabled to investigate the current status of the e-procurement including drives and barriers to e-procurement and highlighted barriers to overcome for successful implementation of e-procurement within Sri Lankan construction industry.

Key words: Construction, Drivers and barriers, E-procurement, Sri Lanka

INTRODUCTION

Rapid evolution and spread of *Information Technology* (IT) during past has increased usage of IT in every category of business. Issa *et al.* (2003, p.15) states that *"to survive and succeed in today's business world, companies of any size, public or private, from any industry, from leaders to start-ups, feel the need and the pressure to develop strategies to*

catch up with information technology". Chen and Rankin (2006) indicated that e-business is becoming a key component in business operations that enables transforming most industries to adopt for globalization. In this context, inefficiencies of traditional procurement processes and cycles are eliminated by the introduction of network based electronic procurement systems. Corsi (2006, p.20) defines e-procurement as "*the use of electronic methods, typically over the internet, to conduct transactions between awarding authorities and suppliers. This process covers every stage of purchasing, from the demand estimation and the needs identification, through the tendering process, to the payment and potentially the contract management.*"

While construction industry is unique in comparison to other industries (McIntosh and Sloan, 2001), Rivard *et al.* (2004) argued that information plays vital roles in all construction projects. Thus, information technology (IT) undoubtedly has a profound impact on how organizations in the industry operate. Tas and Irlayici (2007) also indicated that since projects become more extensive and complicated it is very common to use information technology in all industries and production activities, one of which is construction industry. However, construction industry has been slow to adopt the latest technologies on its end product and possibly e-procurement is no exception.

The adoption of e-procurement technology in Sri Lanka emerged through the development of e-commerce. In order to improve efficiency, transparency and accuracy of procurement activities in the public sector, several progressive steps have been initiated, such as publishing standard bidding documents, advanced procurement notices, publication of contract awards, and standard specifications in the national procurement agency web site (Liyanage, 2005). However, Lane *et al.* (2004) argued that electronic commerce is in the intermediate stages of adoption in Sri Lanka. The Lanka business online (2009) also indicated that public fails to embrace e-commerce due to doubts on privacy and data protection issues. Further, The lack of skills and awareness of e-commerce is further aggravating this in small medium enterprises industry (Kapurubandara and Lawson, 2006). Studies by Davidrajuh, (2004) revealed that proper measures for improving e-readiness of Sri Lanka has not been identified or put into practice. Bcarr and Tessler (2002) highlighted the importance of high IT literacy rates to support the development of a modern knowledge society. Sovis (2002) indicated the attitude of communities is changing with the introduction of IT at all levels which is a very important aspect of the development of e-commerce in Sri Lanka. The penetration of IT to the country emerged with the launching of e-Sri Lanka in November 2002, by the Government of Sri Lanka with the objective of using ICT to foster social integration, peace, economic growth, and poverty reduction. According to e-government center of excellence (2009) the Government expects to develop multi-stakeholder partnerships with the private sector and civil society, to take the dividends of ICT to every village, to every citizen, to every business and make government more citizen-centric through the implementation of e-Sri Lanka. Furthermore, Sri Lanka Telecom (SLT), launched a web based e-procurement system in 2005 for the first time in Sri Lanka with the objectives of facilitating complete automation of the processes enabling 'paperless' transactions relating to procurement of goods and services (Sri Lanka Telecom, 2009). E-procurement in public sector is continuously being encouraged by National Procurement Agency

(2006) in which emphasizes on the prior concurrence of the respective, procurement committees in initiating e-procurement activities. In this context, it is not an exception to Sri Lankan construction industry, which involved in with over 1.5 million people both directly and indirectly. Sustainability of the industry and elimination of regional imbalances requires more attention than ever before with the introduction of advance information technology to the construction industry. Thus, this study aims to investigate the current status of usage of e-procurement while identifying the drivers and barriers to e-procurement within the construction industry of Sri Lanka.

E-procurement

The term e-procurement results from the electronic support of procurement activities between a purchaser and a supplier through information and communication technologies (Chaffey 2002 cited Afsharipour *et al*., 2005; Kameshwaran and Narahari, 2003). Breckland Council (2006) further indicated that this includes the early stages of requesting quotes from suppliers and tendering for bids to awarding contracts, managing them and also buying goods directly online through catalogues. Aik (2005) indentifies that procurement is one of the most important parts in the construction project life cycle. McIntosh and Sloan (2001) pointed out advantages that IT can offer are very attractive but it is the changes required to reap these benefits that pose the greatest challenge for the construction industry. However, Stewart and Mohamed (2003 cited Kivrak and Arslan, 2008) highlighted that most of the construction companies still use the traditional ways to communicate within their companies and with other parties such as exchange of documents like drawings and specifications in paper format.

Furthermore, wide range of studies on e-procurement for general goods and services reveals the reluctance of adopting of e-procurement to the industries. In spite of these, several worldwide studies on use of e-procurement carried out by Assar and Boughzala (2006) on public e-procurement processes of France, Hawking *et al*. (2004) on general e-procurement in Australia, a study by Afsharipour *et al.* (2006) in Iran, Mashaleh (2007) in Jordan and Manalo (2005) in Philippines highlighted the importance of e-procurement to enhance productivity, efficiency and effectiveness in various disciplines. Studies specific to construction industry also revealed that Information Communication Technologies (ICTs) have the potential to improve processes and solve specific problems in the construction sector including the e-procurement. For an example, Issa *et al*., (2003) highlighted the wiliness of US construction industry to implement e-business solutions specific to construction industry. Chen and Rankin (2006) discussed the potential opportunities for e-procurement in Canada and McIntosh and Sloan (2001) pointed out challenges associated in United Kingdom construction industry. Hore (2006) discussed on innovative ICT applications in a study in Ireland. In addition a survey by Aik (2005) in Malaysia and Kivrak and Arslan (2008) in Turkey indicated that majority of the construction firms did not fully utilize the potential of IT, but willing to implement IT tools more in the future.

Drivers and barriers to e-procurement

First study on identifying the drivers and barriers to e-procurement in construction was conducted by Rankin *et al*. (2006) in Canada. Thereafter, Eadie *et al*. (2007) conducted a similar study for Northern Ireland focusing on public sector construction e-procurement.

The adoption of e-procurement in the business world has been grounded on number of drivers which can be identified from literature. A report from Breckland Council (2006) indicated the main drivers behind the e-procurement strategy are to take maximum advantage of the aggregated purchasing power and to reduce the transactional costs of the procurement process. Ward (2006), Kurnia and Rahim (2007) and Mastrogregori (2008) also stated that e-procurement leads to lower transaction and processing costs which increased efficiency. The Financial Times (2007) in Malaysia indicates quality, cost efficiencies and environmental benefits are key drivers for e-procurement. Transactional benefits, compliance benefits, management information benefits, price benefits and payment benefits are suggested by Eakin (2003). Afsharipour et al., (2006) highlighted the positive effects of e-procurement on communication along the supply chain, quality enhancement and increased transparency of purchasing processes. Chin-Fu *et al.* (2006) also stated that operational and strategic benefits are two major benefits of implementing web-based e-procurement systems where operational benefits arise from lowered transaction cost and heightened information transparency. Furthermore, Coopers (2001) indicates e-procurement enables to promote the use of e-commerce and to optimize inventory levels. A study by Cuthbert (2003) indicated that cost control and ROI (Return on Investment) were ranked as the highest motivators in implementation of e-procurement. In addition, Manalo (2005) and Mcdermont (2006) suggested that reduction of opportunities for corruption also can be achieved through the use of e-procurement.

Despite the merits of e-procurement, many had highlighted numerous barriers to e-procurement. Dean *et al*., (2006) highlighted that an electronic environment presents obvious opportunities for collusion between principal and certain tenderers. Fraud by tenderers is a minefield of legal uncertainties for fuelling protracted disputes. Ting and Wong (2002), further indicated that liability risks, contract enforceability, security, global trading and IPR, are the most potential legal issues arising from e-procurement. Goonatilake *et al*. (2009) argued that security is the most important concern in e-collaboration since constant vigilance is necessary to address concerns in networks that controls shared data. More importantly, matters such as intrusion must be confronted directly when facilitating e-collaboration technology. Cole (2004) indicated that lack of management support as a barrier for e-procurement. In addition, inadequate technological infrastructure, implementation costs to support e-procurement, insufficient skilled staff result in slow uptake of e-procurement (NeRPA, 2006). Next section discusses on the research methodology adopted to determine the drivers and barriers specific to e-procurement in construction industry in Sri Lanka.

Methodology

A comprehensive literature review was carried out to identify extensive range of aspects that influence e-procurement both locally and globally. A close ended structured

questionnaire was used as the mode of data collection to identify status of e-procurement including drivers and barriers to e-procurement in Sri Lankan construction industry. Dillman (2000), indicated that three types of data variables can be gathered from questionnaires; opinions, behavior and attributes. Accordingly, the questionnaire survey was designed to mainly gather opinion and behavioral variables which respondents believe to be a driver or barrier regarding to e-procurement based on the experience. First section of the questionnaire was to gather data on status of e-procurement, which covers activates on which e-procurement utilized such as, purchases, sales and services. Second section was to gather data on drivers and barriers on e-procurement which includes 40 drivers and 54 barriers respectively.

Through snow-ball sampling a total number of 50 respondents were selected and only 27 had responded. Respondents of the sample survey included professionals from both private and public sector who are involved in either building or civil engineering having more than five years of working experience. Furthermore, the sample was restricted to large-scale construction organizations, which have their registered offices in Colombo metropolitan area. The selection was justifiable by the fact that they are the organizations that have the necessary capacity to invest on e-procurement. Although, these organizations have their head quarters in Colombo the capital of Sri Lanka they operate countrywide in all types of construction projects. Table 1 shows the profile of the respondents who participated in the questionnaire survey. Professionals included Architects, Engineers, Quantity Surveyors, Project Managers, Procurement Managers, Contract Managers and Directors in consultant and contactor organizations who had experience in e-procurement.

Table 1: Questionnaire respondent profile

Category	Number of questionnaires sent	Number of questionnaires received	Response rate
Contractor (public)	04	02	50%
Contractor (private)	29	15	52%
Consultant (public)	03	03	100%
Consultant (private)	14	07	50%
Total	50	27	54%

Ordinal scale was used in the form of a Likert scale to represent the degree of agreement or disagreement towards the importance level on identified drivers and barriers to e-procurement. Naoum, (1998) indicated that data set is said to be ordinal when the values assigned need to be ranked and also the intervals between the values may not necessarily be equal or represent actual quantities. Bendixen and Sandler (1995) asserted that the ordinal scale can be considered as an interval scale provided that the distance (intervals) between the adjacent points of the scale is equal and when the scale has at least 5 or 7 categories (Garson, 2007). A Likert scale was used to capture variables on degree of importance represent five scales of *"agreement"* (Strongly disagree, disagree, neutral, agree, and strongly agree). Further, *neutral"* column was added so that the tendency for giving an inaccurate answer when the respondents lack knowledge or opinion for a particular question was minimized (Krosnick, 2002). Relative index (RI) is used to

identify the preference for each factor from the views point of respondent. The following formula was used to calculate the RI;

$$RI = \frac{5N_5 + 4N_4 + 3N_3 + 2N_2 + 1N_1}{5(N_5 + N_4 + N_3 + N_2 + N_1)}$$

Where: N5 = number of respondents who answered "Strongly Agree", N4 = "Agree", N3 = "Neutral", N2 = "Disagree" and N1 = "Strongly disagree". This technique facilitates to identify the drivers and barriers in order of preferred importance where magnitude of importance is the limitation.

Results and Discussion

Findings of the study revealed that status of e-procurement in construction organizations is relatively poor compare to the other sectors. Only 55% of construction organizations utilized e-procurement for activities such as purchases and procuring contracting services. Table 2 illustrates the summary of activities that utilized e-procurement.

Table 2: Summary of activities that utilized e-procurement

Category	Activities	%
Purchases	Materials	93
	Plant & equipments	46
Sales	Property	0
	Goods	26
Services	Procuring land	0
	Procuring professional services	53
	Procuring contracting services	66
	Management services	20
	Maintenance services	13

Accordingly, around 93% of organizations are involved with purchasing materials through means of e-procurement, whereas only 46% are involved in purchasing plant and equipment. Even in this process, only the initial stages of purchasing are conducted online, whereas latter stages such as placing orders and invoices are mostly handled through traditional manual processes. Furthermore, none of the organizations utilized e-procurement for property sales and procuring land. However, the survey revealed that around 63% of organizations have fair awareness, fair attitude and interest on e-procurement. More importantly contractors were found to have more concerns towards e-procurement than consultants. However, the survey revealed that only 18% had initiated major investments on e-procurement. According to public sector respondents, government regulatory systems, guidelines and procedures on procurement have a detrimental effect on the uptake of e-procurement. The findings related to drivers and barriers to e-procurement are discussed in the next section.

Major drivers identified

Evaluation of 40 drivers identified through previous research revealed that reduction of paper work; cost savings on process of tender/ purchasing, reduction of administrative costs and greater market access are identified as the major drivers for adaptation of e-procurement as illustrated in Table 3.

Table 3: Major drivers for the adoption of e-procurement

Ranked factors of drivers	RI
Reduces paper work (Documentation)	0.904
Process cost savings (Tender / Purchase Process)	0.844
Reduces administration cost	0.822
Allow greater market access and opportunities	0.807
Increases productivity	0.793
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Reduction in time through greater transparency	0.644
Reduced construction life cycle	0.622
Improves data transaction accuracy & reduced errors.	0.622
Reduction of corruption in the construction industry	0.593
Lowest price for materials	0.570

As indicated by Ward (2006), Kurnia and Rahim (2007) and Mastrogregori (2008), lower transaction and processing costs also identified as a major driver for e-procurement in Sri Lanka. However, effective communication along the supply chain, quality enhancement, increase transparency of purchasing processes and reduction of opportunities for corruption (Afsharipour et al. 2006; Chin-Fu *et al.* 2006; Manalo 2005 and Mcdermont 2006) were identified as the least significant drivers to e-procurement.

Major Barriers identified

Evaluation of 54 barriers identified through previous research revealed that lack of a national IT policy relating to e-procurement issues, technical expertise, professional bodies to regulate the system and legal challenges are identified as the major barriers for implementing e-procurement in Sri Lanka as illustrated in Table 4. These are indicative of lower state of industry maturity with respect to e-procurement in the construction sector in Sri Lanka.

Table 4: Major barriers for implementing e-procurement

Ranked factors of barriers	RI
Lack of a national IT policy relating to e-procurement issues	0.933
Lack of technical expertise	0.859
Legal challenges	0.844
Lack of professional bodies to regulate the system	0.830

Replacing and modifying the existing procurement systems	0.800
No common accepted standard	0.793
Security in the process - Data transmission to the wrong person	0.785
Confidentiality of information - unauthorized viewing	0.778
	
Upper Management Support / Lack of Leadership	0.652
Unemployment for traditional employees	0.622
Over responsibility for employees	0.607
Other Competing Initiatives	0.607
Company access to the internet	0.600

In addition to that, as indicated by Dean *et al.*, (2006), Ting and Wong, (2002), Goonatilake *et al.* (2009) legal and security related issues were identified as major barriers for e-procurement. Furthermore, less awareness of e-procurement among the construction industry was also identified as major barrier for e-procurement. However, upper management supports, lack of leadership were identified as least significant barriers for e-procurement.

Conclusions

E-procurement plays a key role in the advancement of procurement processes in all the industries with significant major benefits attributable to its use. Thus, most disciplines and industries keep exploring their practice, capacity and new initiations in relation to e-procurement around the world. In this context, this paper explored the status of e-procurement use in the Sri Lankan construction industry and analyzed the drivers and barriers to e-procurement. Results of questionnaire survey revealed that, only 55% of organizations are involved in e-procurement related activities such as, purchasing and procuring contracting services. Furthermore, although, over 63% of organizations have a fair awareness on e-procurement, only, 18% had initiated major investments on e-procurement. Reduction of paper work and administration cost savings are identified as major drivers for implementation of e-procurement whereas lack of national IT policy relating to e-procurement use, technical expertise, professional bodies to regulate e-procurement systems and legal challenges are identified as the key barriers to e-procurement. Accordingly, study this established the necessity of introducing national policies and institutional framework for e-procurement to address issues pertain to e-procurement. Furthermore, the study identified the importance of capacity building both at personal and organizational level as significant for `the progress of e-procurement in Sri Lankan construction industry.

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