
Adopting new approaches for public procurement efficiency: critical success factors (CSFs) for the implementation of e-procurement in Uganda's public sector

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Abstract: In the public sector, the issue of efficiency and effectiveness (value for money) is now a key governance agenda. Electronic procurement has become prominent in the language and strategy of the public sector effectiveness in both developed and developing countries. E-procurement is currently one of the key topics in the e-government arena; many organisations need advice and guidance about proceeding with this new approach. In this paper, we examine the critical success factors (CSFs) for implementation of e-procurement technologies in Uganda's public sector context. The findings of this study confirm that in Uganda's context, the major CSFs for e-procurement include:

- 1 careful involvement of suppliers
- 2 systematic risk management approaches
- 3 systematic redesign of organisational processes
- 4 use of experienced consultants
- 5 careful selection of software providers.

We suggest policy and managerial implications in the adoption of e-procurement.

Keywords: e-procurement; e-governance; critical success factors; CSFs; public sector efficiency and effectiveness; governance; Uganda.

Reference to this paper should be made as follows: Basheka, B.C., Oluka, P.N. and Mugurusi, G. (2012) 'Adopting new approaches for public procurement efficiency: critical success factors (CSFs) for the implementation of e-procurement in Uganda's public sector', *Int. J. Procurement Management*, Vol. 5, No. 6, pp.712–732.

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1 Introduction

Governments world over have identified e-procurement as a key strategic tool in increasing the competitiveness of their nations. The use of electronic procurement technologies (EPTs) is an increasingly important issue that is being specifically and systematically addressed as practitioners continue to seek its relevancy in building business process efficiencies and effectiveness. Indeed with the growth of the internet several developed economies worldwide have embraced e-procurement as a priority under the e-government scheme and have implemented or are in the process of implementing e-procurement systems (Vaidya et al., 2006).

Despite the benefits that can be achieved from a successful e-procurement implementation in the public sector, a number of failures of e-procurement initiatives in a number of public sector agencies in the USA, UK and New Zealand in recent years has been reported (Vaidya et al., 2006). Heywood (2002) observes that e-procurement results in large investments of time and money, without absolute certainty that its full potential will be achieved every time. While development partners in conjunction with governments are encouraging public sector agencies to adopt e-procurement, its implementation does not appear to have been smooth and the rate of e-procurement implementation success has been less than spectacular (Stenning & Associates Pty Ltd., 2003). The development and implementation of e-procurement has not been as trouble-free as some of the solution providers have suggested, nor has it readily realised the purported cost savings and other attendant benefits. It is also proving to be difficult given the level of investment expected in terms of providing catalogue information to buyers, and marketplaces using different technologies, platforms and business languages (Office of Government Commerce, 2002).

This new process is expected to benefit all facets of procurement, including selecting, bidding, payment, and inventory processes. The implementation of e-procurement

initiatives should then be seen as an effort to improve the procurement goals, which normally include quality, timeliness, cost, minimising business, financial and technical risks, maximising competition, and maintaining integrity (Thai, 2001). While this has been highly feasible for some organisations, leading to a flow of benefits, for others, such benefits have not been realised yet. Despite the potentials promised by the vendors of such systems, e-procurement got off to a slow start (Puschmann, 2005; CGEC, 2002; ECOM Group, 2002; Birks et al., 2001; DOF, 2001). Implementation of e-procurement initiatives has been slow and hardly any evidence exists in regard to critical success factors (CSFs) and challenges. Implementation of e-procurement initiatives in the public sector therefore is still in the early stages of infancy in a number of developing countries (<http://www.procurement.ug>). This assertion is supported by Tonkin (2003) who contends that there is hardly any evidence of extensive use of e-procurement in the public sector which possibly could be a proxy indicator of why the academic literature covering early public sector adoption of e-procurement is limited. Croom and Brandon-Jones (2004) defines e-procurement as the use of internet-based (integrated) information and communication technologies (ICTs) to carry out individual or all stages of the procurement process including such activities like sourcing electronic advertising of tenders, electronic submission of tenders and receipt, electronic ordering and post purchase review among others. E-procurement may also take many different forms that concentrate on one or many stages of the procurement process such as e-tendering, e-marketplace, e-auction/reverse auction, and e-catalogue/purchasing. Therefore, e-procurement can be viewed more broadly as an end-to-end solution that integrates and streamlines many procurement processes throughout the organisation. Wilson (2004) argues that e-procurement despite the obstacles, has proven to help companies manage their indirect spend effectively while simultaneously making it easier for end users to place their orders.

In Uganda e-procurement is being fronted by Public Procurement and Disposal of Public Assets Authority (PPPDA) although still at a very minimal level and rather at a slow pace compared to Kenya and Tanzania which are in advanced stages of its implementation. This has contributed to the long noted inefficiency, ineffectiveness, corruption and other social evils in the procurement function resulting in the loss of huge amounts of money. As most e-procurement initiatives in developing countries, the fundamental problem motivating this study is the need to understand the CSFs underlying the implementation of e-procurement initiatives in the public sector. In the developed countries although a number of public sector agencies are actively pursuing e-procurement, evidence from business press reveals that many of the efforts are not meeting original expectations. In fact, implementation rate of public procurement systems has been slow and many government agencies tend to overstate the degree to which they are involved in e-procurement (MacManus, 2002).

This paper examines the CSFs in particular the necessary conditions for e-procurement implementation and to establish which factors significantly influence e-procurement initiatives in Uganda's public sector. We develop an analytical framework of the CSFs that intending public sector organisations interested in implementing e-procurement initiatives could exploit.

2 Theoretical framework

CSF is the term for an element that is necessary for an organisation or project to achieve its mission. The idea that there are a few factors which are decisive for the success of the company, and that these factors can be ascertained, was first introduced by Daniel (1961) and later mainly elaborated by Rockart (1979) and Bullen and Rockart, (1981) in the context of designing management information systems. The genesis of the conceptual framework presented by Rockart was later formulated in a book by Schr er [(1990, p.17) in Broadbent and Lofgren, (1991), p.16] in terms of 80:20 rules. According to the rules only 20% of the total effort required to solve a problem fully is needed to achieve an 80% result. The CSF method seeks to identify those 20% factors. In 1995, James A. Johnson and Michael Friesen applied it to many sector settings, including healthcare. Many argue that the success of a business is based on identifying a niche market that will ultimately result in growth, development and profitability. Finding that top management rarely used management information systems, they argued that such systems must be structured according to the information needs of the managers. In order to ascertain managers' information needs and link them to the management information system, they coined the term *CSF*.

CSFs are, according to Bullen and Rockart (1981), "the limited number of areas in which satisfactory results will ensure successful competitive performance for the individual, department or organization. Critical success factors are the few key areas where 'things must go right' for the business to flourish and for the manager's goals to be attained". Rockart distinguishes between five sources of CSFs:

- 1 *The industry*, e.g., demand characteristics, technology employed, product characteristics, etc. These can also affect all competitors within an industry, but their influence will vary according to the characteristics and sensitivity of individual industry segments.
- 2 *Competitive strategy and industry position* of the business in question, which is *determined by the history and competitive positioning* in the industry.
- 3 *Environmental factors* are the macroeconomic influences that affect all competitors within an industry, and over which the competitors have little or no influence, e.g., demographics, economic and government legislative policies, etc.
- 4 *Temporal factors*, which are areas within a business causing a time-limited distress to the implementation of a chosen strategy, e.g., lack of managerial expertise or skilled workers.
- 5 *Managerial position*, i.e., the various functional managerial positions in a business has each their generic set of associated CSFs.

CSFs can thus be characterised by the extent to which they are internal or external to the business, or that part of it over which the manager has control, and, consequently, whether they refer to something which should be monitored or built. Maintenance of technological leadership would be a source of CSFs which the business can build, while changing consumer demographics would be a force that can be monitored, but not controlled (Boynton and Zmud, 1984; Ferguson and Dickinson, 1982; Munro and Wheeler, 1980).

The methodological approach chosen for a CSF analysis can be carried out by applying different empirical research techniques (questionnaires, structured interviews, and group discussions or document analysis) depending on the objectives and specific context of what the researcher is concerned about. Broadbent and Lofgren (1991) suggested that no single technique for CSF analysis can be nominated and a variety of techniques are reported in the literature. A combination of different methods is likely to increase the reliability of results. This study involved the use of questionnaires and interviews.

3 Literature review and hypotheses

3.1 CSFs of e-procurement

PriceWaterHouse Coopers Report (2001) observes that the introduction of ICTs for procurement will not on their own, deliver savings unless the fundamental benefits of e-procurement are tied directly to changes in strategic sourcing, business processes, user behaviours and relationships with suppliers. This calls for change in the wider public sector procurement environment. Knudsen (2003) supports the revolutionisation of procurement with an aim to cut costs and foster transparency through e-procurement. However, Wyld (2002) warns that for any organisation to embrace any technology. It is important that the business case is stipulated and viability and clarity sought before embarking on the project. This, therefore, requires gauging and assessing the worth of e-procurement otherwise it may lead to over shooting the budget without any indication of the project delivering to its billing. Embracing e-procurement paradigm requires focus and good management just like any other information system project.

E-procurement implementation includes a variety of constructs and measures in understanding and predicting implementation success (OSD, 2001; CGEC, 2002). CGEC (2002) report indicates that e-procurement requires technology, business process, and/or people/organisational issues if the value chain proposition is to be successful. IBM Global Services (2003), e-procurement report identifies three areas where e-procurement implementation strategy should be focused to ensure that the required practises, processes, and systems are developed and rolled out in a consistent manner across the public sector. These areas include: organisation and management, practises and processes, and systems and technology. Vaidya et al. (2006) refers to the above terms as 'implementation perspectives' all of which highlights important aspects of the e-procurement implementation process. However, the findings of this study were presented in the form of propositions, rather than hypotheses, whose findings were informed by interviews and confirmed by case studies.

3.1.1 End-user uptake and training

Shifting from traditional procurement approaches to new technologies (e-procurement) requires training staff in procurement practises and the use of e-procurement tools which are critical to the success of an e-procurement initiative (World Bank, 2003). End-users can realise the immediate benefits of the e-procurement system once they understand the operational functionalities (CGEC, 2002). Hence, identifying the skills training needs should be given a high priority, required by all those engaged in procurement (ECOM

Group, 2002). Thus, the success of a public sector e-procurement initiative depends on users and buyers making use of the new process and system. The solution must attract end users to view e-procurement as the preferred means by which to purchase goods and services (KPMG, 2001). The success of the project also depends on communication to the users (Birks et al., 2001). According to the CGEC (2002), the two major obstacles to increasing support among users are their level of technological awareness and acceptance, and their willingness to change long-established internal business processes. As the implementation process develops, periodic user satisfaction surveys may identify the possible need for additional training (OSD, 2001).

- H1 The level of end-user uptake and training is positively associated with the organisation and management implementation perspective of an e-procurement initiative.

3.1.2 Supplier adoption

Birks et al. (2001) argued that e-procurement implementation success is closely related to early supplier involvement. It is important to demonstrate the proposed solution to the suppliers and discuss any necessary changes, issues, and concerns such as various options in developing and maintaining supplier catalogues. This assertion is supported by OSD (2001) who contends that providing opportunities for suppliers to offer their feedback allows the public procurement department to monitor areas for improvement and adjust practises accordingly. However, ECOM (2002) contends that this practise of engaging suppliers has to be done with caution because many suppliers may be unwilling to conduct business electronically with public sector agencies because they are unclear about the benefits to be gained, they might see e-procurement as a means by which public sector agencies will simply attempt to force down prices. Suppliers, therefore, should be educated on the e-procurement benefits that can be provided to them through a process of consultation as early as possible in the project. The degree to which the success of an e-procurement initiative can be realised may well be related to the level of e-readiness of suppliers, and appropriate communication with suppliers is therefore important (AOT Consulting, 2003).

- H2 The level of supplier adoption is positively associated with the organisation and management implementation perspectives of an e-procurement initiative.

3.1.3 Compliance with best practise for business case/project

If an e-procurement initiative is to deliver the planned benefits then users and buyers must make changes to the way they work, which requires championing the project and senior management sponsorship. Specifically important, but also challenging, is ensuring 'Buy In' (Birks et al., 2001). Birks (ibid) suggests that the business case processes for e-procurement should include identifying drivers, understanding the starting point, benefits, approaches, affordability, risks, and benefit realisation. To ensure achievement of the e-procurement objectives, the implementation project should proceed, as far as possible, in alignment with the business case. It should be noted that in Uganda public procurement is governed by strict laws set up by government. Hence, a preliminary review of the existing public procurement process needs to be carried out as a first step

and there after a holistic approach in implementing public e-procurement information requirements be adapted.

- H3 The level of compliance with best practise/project management is positively associated with the organisation and management implementation perspective of an e-procurement initiative.

3.1.4 System integration

KPMG (2001) argues that it is very important to determine the level of integration required between the e-procurement solution and existing information systems. If integration issues are complex, it is more likely that underlying business processes within an organisation should be changed or adapted (ECOM, 2002). Therefore, e-procurement system should be linked to the financial management system in order to facilitate the process of online payment to suppliers (World Bank, 2003). It is necessary for purchase transactions carried out through an electronic ordering transaction support system to be reflected in an agency's Financial Management Systems and communicated to suppliers for fulfilment (DOF, 2001). E-procurement information systems thus needs close communication with the stakeholders (PDEs, PPDA, Providers and the Public).

- H4 The degree of system integration is positively associated with the systems and technology implementation perspective of an e-procurement initiative.

3.1.5 Security and authentication

Security of data is critical in e-procurement systems because of the sensitivity of the government data and the legal nature of orders and payments. The system must have mechanisms for identifying and authenticating the user who places an order so that the supplier knows it is safe to fulfil the order. In an e-procurement environment, Birks et al. (2001) relate the security requirements at the e-tendering stage to authentication, arguing that e-purchasing systems and processes need protection because they involve a financial transaction and may be vulnerable to fraud. Stenning & Associates Pty Ltd. (2003) highlights the need for transactions between different systems to be exchanged in secure ways with absolute assurances regarding the identities of the buyers and suppliers. In order to encourage buyers and suppliers to engage in e-procurement, it is critical that both parties have complete confidence and trust in the underlying security infrastructure.

- H5 The degree of security and authentication is positively associated with the systems and technology implementation perspective of an e-procurement initiative.

3.1.6 Reengineering the process

Stenning & Associates Pty Ltd. (2003) stated that as a significant proportion of the benefits to be gained from implementing e-procurement initiatives are related to the changes made through process reengineering rather than the implementation of the e-procurement initiatives themselves, necessitating revision of the existing processes for dealing with procurement. Birks et al. (2001) suggest that the process of reengineering should not only address process but also supplier relationships and all the internal groups affected by procurement. Therefore, e-procurement should be viewed by all stakeholders as an enabling mechanism to make the process of procurement more efficient in terms of

cost, time, and achievement of value for money (ECOM Group, 2002). Where existing procurement practises and procedures may contradict the goals and objectives of the new initiative, the implementation of e-procurement will require the reengineering of existing purchasing processes (KPMG, 2001). Birks et al. (2001) noted that roles and responsibilities might change substantially with the new process, which requires staff to adapt according to these.

H6 The degree of reengineering of the process is positively associated with the practises and processes implementation perspective of an e-procurement initiative.

3.1.7 Performance measurement

Vital to the successful delivery of the business case is the continuous measurement of the key benefits of e-procurement. Birks et al. (2001) contends that measurement drives behaviour and is a key to making the change a success. According to CGEC (2002), a general lack of measurement capability inhibits assessing organisational progress. It is important to agree and define key performance indicators (KPIs) early in the process to enable successful benefits tracking and distil the business case into measurable KPIs. These KPIs should then be monitored throughout the project. Hence establishing goals and baselines is very important.

H7 The level of use of the performance measures is positively associated with the practises and processes implementation perspective of an e-procurement initiative.

3.1.8 Top management support

Top management leadership and support is critical to the success of an e-procurement implementation (AGV, 2003). The top management team (steering committee) must involve all those concerned to develop an implementation strategy (ECOM Group, 2002). Considerable attention and support need to be provided by senior management to ensure that the procurement reform has been well understood in the agency (Stenning & Associates Pty Ltd., 2003). Furthermore, the executive management team is responsible for setting the vision and goals, bringing about collective commitment for change in process and organisational structures, and formulating the policies and strategies necessary to put an e-procurement initiative in place (World Bank, 2003).

H8 The level of top management support is positively associated with the organisation and management implementation perspective of an e-procurement initiative.

3.2 E-procurement implementation strategy

According to Neef (2001), the creation of documented and executable strategies prior to the deployment of the e-procurement solution is an important CSF. This notion is further supported by the OSD (2001) Report findings that as the procurement strategy is intended to provide savings enabled by the technology, e-procurement should be procurement-driven as well as technology-driven. Therefore, a clearly defined e-procurement strategy not only emphasises the importance of e-procurement in the public sector but takes into consideration major institutional changes from the procurement process perspective as well as from the organisational perspective (World Bank, 2003). Another report (DOF, 2001) notes that the e-procurement strategy should be

based on the introduction of sound procurement practises while taking into account the differences in requirements of the public and private sectors.

H10 The level execution of e-procurement implementation strategy is positively associated with the organisation and management implementation perspective of an e-procurement initiative.

3.2.1 Communication standards

Stenning & Associates Pty Ltd. (2003) contends that e-procurement requires various buyer-supplier systems to exchange information and electronic documents. This requires common standards. It seems that there is agreement emerging on the adoption of extensible markup language (XML) as the basis for standards. The XML standard defines the content in communication and in the selection of general data formats (KPMG, 2001). In defining e-procurement requirements, Birks et al. (2001) claimed a key concern is the standard for formatting electronic catalogues. The World Bank (2003) suggests that developing an e-procurement system in an open environment allows it to link to other systems for interoperability and simplifies upgrading the system. According to the DOF (2001), successful introduction and adoption of e-procurement in the public sector also depend on the ease with which procurement-related data can be exchanged both within the agencies and between their supply bases. In order to achieve close communication, e-procurement information systems need to be decentralised so that the process is improved by the closeness of the concerned stakeholders. This will further entail centrally aggregating e-procurement information regularly and disseminating it to the stakeholders. There is also need to constantly review and manage the e-procurement information system being implemented.

H11 The level of communication standards is positively associated with the systems and techno.

It is, therefore, paramount that Uganda develops its own e-procurement information system and adopts a customised approach of implementing the information system, in light of the existing procurement system, cultures, history and IT knowledge level of the stakeholders. Moon (2005) contends that if e-procurement is applied well it will be hyped as the deliverance of the public sector. Hart and Teeter (2000) however, argues that both public and private sector managers must have positive attitudes towards the prospects of e-government, if they are to become smart buyers despite some security and privacy concerns.

4 Methodology

4.1 Research design

This study was exploratory intended to validate the benefits and CSFs for the implementation of e-procurement system in public sector organisations of Uganda. The benefits for adopting e-procurement technologies are however beyond the scope of this paper. Exploratory studies (termed as formulative research studies) have their main purpose as being formulating a problem for more precise investigation or being the

development of the working hypotheses from an operational point of view (Kothari, 2004). In such studies, the major emphasis is the discovery of ideas and insights.

Exploratory studies are undertaken when not much is known about the situation at hand, or no information is available [Sekaran, (2003), p.119]. Implementation of e-procurement technologies in Uganda has limited information and the subject has not been studied and therefore less understood. In particular, there is lack of systematic efforts in documenting the CSFs which supposedly favour its adoption in the country's public sector context. Such circumstances favour the use of exploratory research approaches.

According to Amin (2005, p.201), exploratory research may take the form:

- 1 review of available literature
- 2 expert surveys
- 3 analysis of case studies
- 4 pilot studies.

In our study three but expert interviews were used. There was no available information on experts on e-procurement management projects; given the infancy of the subject in the field of public procurement. We reviewed extensive international literature and case studies on success stories for e-procurement initiatives.

4.2 Survey instrument

The survey instrument had three major sections. Section A (with 27 items) measured the benefits of e-procurement; section B (with 22 items) covered a set of CSFs and section C (with an option of listing five major challenges) related to the challenges for implementing e-procurement in Uganda. The items for the first two sections were derived from the literature and covered areas modified from attributes covering the areas presented in Table 1.

Through a survey of the e-procurement literature, Vaidya et al. (2006) identifies 11 CSFs as summarised in the Table 1. Vaidya et al. (2006) sub divide the factors for ease of understanding the relative importance of the CSFs into two:

- 1 human factors
- 2 technology factors.

Human factors are those issues dependent on human behaviour and expertise while technology factors are those issues dependent on construction and deployment technologies. Human factors consist of end-user uptake and training, supplier adoption, business case and project management, and top management support. Technology factors consist of system integration and security and authentication. Change management, e-procurement implementation strategy, process reengineering, performance measurement, and technology standards are factors that involve aspects of both categories. We equally reviewed the literature from the Aberdeen Group; a recognised leader of research and analysis of internet-based technologies that automate, streamline and improve procurement and supply chain management processes. Aberdeen Group (2001) reported identifies success factors for managing e-procurement on the basis of a study of 157 firms. Respondent opinion were enlisted on the basis of a scale of 1 that

required respondents to answer yes to an identified CSF and two to represent a 'No' response. This study involved 143 respondents who returned the filled in survey instrument.

Table 1 CSFs and respective item attributes

<i>CSF (variable)</i>	<i>Item attributes</i>
End-users uptake and training	User involvement, user support/communication, user training.
Supplier adoption	Supplier e-readiness, supplier adoption strategy and communication plan, suppliers education and benefits demonstration, compliance to best practises with content and catalogue management.
Business case and project management	Identification of business drivers , business process assessment and requirement, return on investment (ROI), total cost of ownership (TCO), risks identification and management, pilot projects.
System integration	Information matching, sending and receiving of real time information to other information systems, electronic commerce with suppliers.
Security and authentication	Infrastructure authentication and authorisation, confidentiality and integrity, security requirements.
Reengineering the process	Transparency improvement, automated invoice payment and reconciliation, compliance with purchasing procedures and standard.
Performance measurement	Goals and targets, key performance indicators (KPIs), baseline measurement, progress monitoring.
Top management support	Management sponsor, involvement of the steering committee, investment in organisational change.
Change management	Identification and management of key stakeholders, e-procurement impact assessment, potential barriers to implementation, organisational resistance.
E-procurement implementation strategy	Sound procurement practises, opportunities for aggregation, a consistent approach to procurement, relationships with industry and small businesses.

4.3 Data analysis

Data analysis was done using a combination of statistical techniques. Simple descriptive analysis in form of frequencies and percentages were first examined before chi-square measures of goodness-of-fit and factor analysis were computed using a statistical package for social scientists (SPSS) software. We did data entry and cleaning, and then subjected the cleaned data to initial analysis (to assess data quality), then we conducted main data analysis (to answer our research questions) and the final further data analysis was done

during the writing of this final paper. During cleaning of the data, the data was inspected, and erroneous data was corrected. Data quality was assessed using different types of analyses like frequency counts, descriptive statistics (mean, standard deviation, and median), examining the normality (using skewness, frequency histograms, and normal probability plots), as well as though examining associations (correlations, scatter plots). We examined the quality of the measurement instruments during the initial data analysis phase. We used two ways to assess measurement quality namely:

- 1 factor analysis
- 2 analysis of homogeneity (internal consistency), which gave an indication of the reliability of our measurement instrument.

During this stage we inspected the variances of the items and the scales obtained from reliability analysis, the Cronbach's α (alpha) of the scales, and the change in the Cronbach's alpha when an item is deleted from a scale.

Table 2 Reliability analysis results

	<i>Mean if item deleted</i>	<i>Scale variance if item deleted</i>	<i>Alpha if item deleted</i>
B26	25.0797	9.9425	.7094
B27	24.9928	9.6715	.7055
B28	25.0942	10.0860	.7132
B29	25.0797	10.1907	.7177
B30	24.9855	9.0071	.6805
B31	25.0870	9.8756	.7065
B32	24.9058	10.1589	.7258
B33	25.1014	9.9604	.7084
B34	25.1667	10.2129	.7115
B35	25.0942	9.9108	.7072
B36	24.9783	9.5981	.7036
B37	24.9783	9.4083	.6966
B38	24.9638	9.9184	.7155
B39	25.0652	9.9008	.7090
B40	25.0000	9.3723	.6941
B41	25.1304	10.0267	.7083
B42	25.1014	9.6539	.6975
B43	25.0942	9.6334	.6973
B44	25.0580	9.9674	.7117
B45	25.0000	9.8540	.7115
B46	25.0217	9.7878	.7079
B47	25.0435	10.2317	.7214

Table 3 Analysis of variance

<i>Source of variation</i>	<i>Sum of sq.</i>	<i>DF</i>	<i>Mean square</i>	<i>F</i>	<i>Prob.</i>
Between people	66.3231	137	.4841		
Within people	405.9545	2,898	.1401		
Between measures	11.8936	21	.5664	4.1350	.0000
Residual	394.0609	2,877	.1370		
Total	472.2777	3,035	.1556		
Grand mean	1.1927				

5 Findings and discussion

A number of public sector agencies worldwide have identified e-procurement as a priority e-government agenda and have implemented or are in the process of implementing buy-side e-procurement systems (Vaidya et al., 2006). A review of e-procurement literature, primarily from the last five years, shows a lack of core constructs around the CSFs for implementing these initiatives. In Uganda, there is a general lack of research and understanding of the CSFs which are required for adopting this technology in the public sector. Table 4 presents descriptive results on the views and opinions of respondents on each of the 22 items which were included in the survey instrument.

Table 4 Descriptive results of the CSFs for e-procurement implementation in Uganda

<i>The following are the CSFs for e-procurement</i>	<i>Yes</i>	<i>No</i>
1 Adequate planning	121 (84.6%)	22 (15.4%)
2 Appropriate organisational structure	109 (76.2%)	34 (23.8%)
3 Excellent leadership	123 (86.0%)	20 (14.0%)
4 Commitment from the top executives	119 (83.2%)	24 (16.8%)
5 Involvement of lower category staff	105 (73.4%)	38 (26.8%)
6 Involvement of suppliers	122 (85.3%)	21 (14.7%)
7 Adequate and Continuous training	97 (67.8%)	46 (32.2%)
8 Experienced staff	124 (86.7%)	19 (13.3%)
9 Strong project management skills	132 (93.2%)	10 (7.0%)
10 Strong skills of resource management	123 (86.0%)	20 (14.0%)
11 Adequate selection of soft ware provider	107 (74.8%)	36 (25.2%)
12 Systematic risk management	106 (74.1%)	37 (25.9%)
13 Adequate technological infrastructure	104 (72.7%)	39 (27.3%)
14 An appropriate institutional framework	119 (83.2%)	24 (16.8%)
15 Clear and accurate goals	110 (76.9%)	33 (23.1%)
16 Team work	120 (83.9%)	19 (13.3%)
17 Redesigned organisational processes	122 (85.3%)	21 (14.7%)
18 User training and education	118 (82.5%)	15 (17.5%)
19 Use of consultants	110 (76.9%)	33 (23.1%)
20 Enabling legal framework	111 (77.6%)	32 (22.4%)
21 E-procurement champion	115 (80.4%)	28 (19.6%)

When respondents were asked to indicate whether they believed that adequate planning was CSF for e-procurement adoption and implementation in Uganda, 121 (84.6%) of the study respondents answered in the affirmative compared to only 22 (15.4%) who indicated that adequate planning was not necessarily a CSF. The majority of the respondents thus supported a need for organisations to have a plan before implementing e-procurement. This finding supports what the Aberdeen Group indicated that of the ten CSFs, having a plan emerged as number two. Their study noted that before installing the first byte of e-procurement technology, a company must devise a comprehensive plan for deployment as well early as establishing defined goals and milestones for continued improvements and success.

Excellent leadership was also supported by 86% of the study respondents as being a CSF, commitment from the top executives was confirmed by 83% of the respondents, involvement of suppliers by 85%, and having experienced staff was supported by 86% of the respondents. Results above also suggest that 93% of the respondents believed that possession of project management skills was a CSF, having an e-procurement champion was supported by 80% of the respondents, having an enabling legal framework was supported by 77%, user training and education received a rating of 83% and a need to redesign organisational processes was rated by 85% of the respondents.

Table 5 Chi-square results for the CSFs for e-procurement in Uganda

<i>CSFs</i>	<i>Chi square</i>	<i>Sig.</i>
Adequate planning	68.538	0.000
An appropriate organisational structure	39.336	0.000
Excellent leadership	74.189	0.000
Commitment from top executives	63.112	0.000
Involvement of the lowest category of staff	31.391	0.000
Involvement of suppliers	71.336	0.000
Adequate and continuous training	18.189	0.000
Experienced staff	77.098	0.000
Strong project management skills	104.817	0.000
Strong resource management skills	74.189	0.000
Selection of software providers	35.252	0.000
Systematic risk management	33.294	0.000
Adequate technological infrastructure	29.545	0.000
Appropriate institutional framework	63.112	0.000
Clear and accurate goal setting	41.462	0.000
Effective communication	89.294	0.000
Teamwork	73.338	0.000
Redesign of organisational processes	71.336	0.000
User training and education	60.483	0.000
Requires the use of consultants	41.462	0.000
Enabling legal framework	43.643	0.000
Need for a procurement champion	52.930	0.000

Analysis of results in the above table generally suggests that all items received a good rating of above 60% implying the usefulness the study respondents attached to the criticality of each of them. This view is equally supported by the chi-square analysis results in Table 4 which suggest a statistically significant association of each of the variables with the successful implementation of e-procurement in Uganda.

A chi-square goodness of fit test allows us to test whether the observed proportions for a categorical variable differ from hypothesised proportions. Small significance values ($< .05$) indicate that the observed distribution does not conform to the hypothesised distribution. The chi-square test tests the null hypothesis, which states that there is no significant difference between the expected and observed result. In order to develop a model of the most CSFs for adoption of e-procurement in Uganda, we used a factor analytical approach whose results are summarised in Table 6.

Table 6 Factor analysis results on CSFs for e-procurement

<i>Factor</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
Systematic risk management	.83					
Selection of software providers	.76					
Redesign of organisational processes		.79				
Experienced staff		.66				
Involvement of lowest category staff		.62				
Involvement of suppliers			.84			
Strong skills of resource management			.69			
Appropriate organisational structure				.72		
Enabling legal framework				.70		
Use of consultants					.79	
User training and education					.61	
Effective communication						.67
Strong project management skills						.63
<i>Total variance explained</i>	<i>18%</i>	<i>10%</i>	<i>9%</i>	<i>8%</i>	<i>7%</i>	<i>6%</i>

Our survey involved an analysis of 22 CSFs that would support the implementation of e-procurement. Using exploratory factor analysis, our results extracted 13 of these variables as the most CSFs. These factors themselves had varying degrees of strengths as imputed from the factor loadings that came to be associated with each of the extracted items. The 13 items had in all a total variance of 60% with Bartlett's Test of Sphericity at 517.668 (sig. 000, KMO =.623, df = 153). The 13 items loaded on two principle components where the first component had two items explaining 18% and the last component also with two items explained 6%. A ranking order of the 13 items suggests that the most CSFs for implementation of e-procurement in Uganda's public sector include:

Vaidya et al. (2006) identified 11 CSFs grouped into human factors and technology factors while the Aberdeen Group identified ten critical factors. Technology factors consisted of system integration security and authentication. However, the Aberdeen Group (2001) study regarded the factor as not to consider technology as a strategy. Successful e-procurement deployments utilise technology to support a larger procurement strategy but do not view e-procurement as the strategy itself. Our study confirms that

systematic risk management is one of the CSFs for implementation of e-procurement. This finding conforms to what Vaidya et al. (2006) considered to be system integration, security and authentication. We broaden this debate to cover entire risk management framework from both internal and external contexts.

Table 7 Factor loading of major CSFs in Uganda

<i>CSFs</i>	<i>Factor loading</i>
Supplier involvement	.84
Systematic risk management	.83
Redesign of organisational processes	.79
Use of consultants	.79
Appropriate selection of software providers	.76
Appropriate organisational structure	.72
An enabling legal framework	.70
Strong skills of resource management	.69
Effective communication	.67
Use of experienced staff	.66
Strong project management skills	.63
Involvement of lower category staff	.62
User training and education	.61

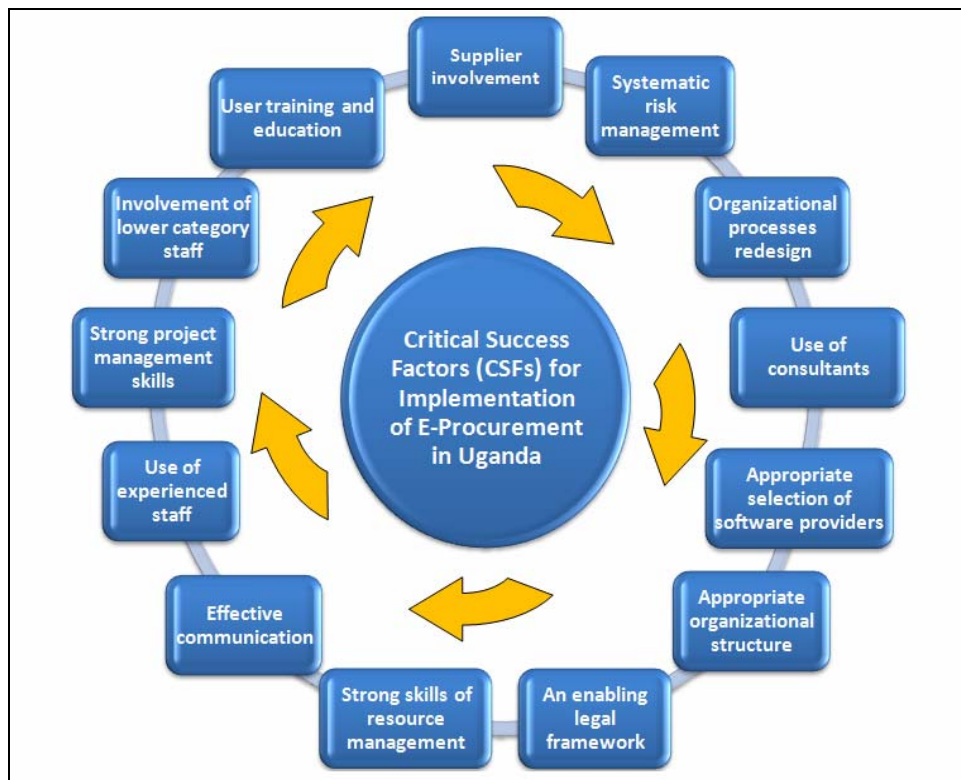
With increasing ambiguities, interdependencies among diverse players, and the scale of supply demand networks, new types of risks in supply chains are evolving (Kleindorfer and Wind, 2009; Kunreuther, 2008). Beside the 'traditional' risks arising from business activities, new risks emerge from sources that are often related to the close collaboration within the supply chain networks (Giunipero and Eltantawy, 2004). This development is triggered by drivers originating from inside and outside their supply chains; the main drivers being related to the trends of globalisation and lean supply chains (Jüttner, 2005). It should also be noted that the procurement function of an enterprise is one area that is targeted second most by fraudsters (Plavsic, 2004). Helsby and Kaizer (2003) contends that enterprises should do more to prevent fraud by actively evaluating and estimating their risk exposure and their vulnerability to fraud, and that these measures should be closely supported by the ongoing monitoring of these risks.

In our study, supplier involvement has emerged as one of the major CSFs for implementing e-procurement in Uganda's public sector. While this finding confirms previous international findings, its ranking in our context suggest a new dimension of scholarly direction. Birks et al. (2001) argue that e-procurement implementation success is closely related to early supplier involvement. It is important to demonstrate the proposed solution to the suppliers and discuss any necessary changes, issues, and concerns such as various options in developing and maintaining supplier catalogues. In Uganda, the public sector is known for its weak position in adopting innovative approaches and one sure way of enabling the success of e-procurement would be to involve the suppliers from the first step. E-procurement, the application of internet technology, pervades each major component of the procurement process. In establishing buying requirements through the specification development process, the concept of e-design has emerged to help facilitate early supplier involvement. Buyer and seller share

information in real time to build specifications that add value to the resulting product. This is very critical for designing an acceptable e-procurement systems and the communication also helps to minimise design complexities and avoids building in unnecessary costs into the specification.

The use of the internet also helps the buying firm in all stages of the supplier selection process, from prequalification of suppliers through the construction of a comprehensive request for proposal to the selection of the final supplier. The application of internet technology to this step in the purchasing process is known as e-sourcing. For example, Free Markets, a pioneer in online sourcing through the reverse auction process, is emerging as a leader in this area of e-procurement.

Figure 1 A conceptual model for CSFs in e-procurement in Uganda (see online version for colours)



6 Conclusions

This study's findings suggest a four-pronged approach to addressing CSFs for e-procurement. The first factor refers to the rationalisation of the firm's management of its suppliers. In keeping with well-documented practise, the firm should reduce the number of suppliers with whom it intends to conduct e-procurement. It also makes sense to consolidate its suppliers and contracts to achieve significant savings and better contract

terms. Finally, in the actual management of its e-procurement business process, it is recommended that the firm centralise control of the different contracts it administers, product data, catalogues, and price updates for indirect procurement to gain greater control over its sources of supply, purchase price, and inventory policies. To minimise implementation complexity, most firms usually initiate e-procurement with indirect rather than direct goods/services.

The second factor probably has the greatest impact on the success of the e-procurement initiative: redesigning affected business processes and consequently, influencing end-user/employee behaviours accordingly to conform with the new systems. Conducting spend pattern analysis prior to business process reengineering helps the firm understand who is doing the spending, how much they are spending, on what they are spending, and with whom they are spending. Providing such visibility precedes assigning ownership to spending business processes and final accountability in achieving savings targets in conjunction with the use of reengineered procurement processes. Redesigning business processes looks into rationalising the flow of transactions and information both within the firm and outside its boundaries, particularly in relationship with its suppliers. Once new IT-enabled business processes are in place, the next logical step is to promote on-contract buying with preferred vendors among the firm's employees or end users. Their active participation in the reengineering effort, to begin with, is an important piece of ensuring their support for the resulting new system. At the end of the day, the one effective way to enforce on-contract buying is to design easy-to-use e-procurement systems so that employees will not perceive the need to override the new, official, automated purchasing processes put in place.

The third factor is concerned with conducting a carefully orchestrated e-procurement technology planning process with one's suppliers and using intelligence in designing the software and mining the data it produces. First of all, the firm needs to design workflow business rules that should make the e-procurement software function in accordance with desired practises. Business rules among trading partners that specify information access and privileges, context-sensitive roles, non-repudiation, purchase order, and pricing, among others, need to be clearly defined and embedded in the software. After the package is functional and starts to gather data, end users should optimise it by mining the data it produces to lend the firm more knowledge and intelligence in maximising savings. Understanding the purchasing behaviour of end users/employees involves aggregating, cleansing, and analysing data in the effort to identify spending areas with the highest costs and consequently, the greatest savings potential. E-procurement vendors have incorporated analytical tools to help firms track how much has been spent on certain product categories, how much has been purchased from vendors, and how efficient the procurement process has been across the entire enterprise.

The second aspect of this factor has to do with the careful selection of suppliers who are technologically prepared. The hub firm or channel master needs to continually involve valued trading partners in their evolving e-procurement planning sessions such as in the use of 'supplier councils' by Harley-Davidson Motor Co. The fourth factor has to do with the firm's actual selection of the e-procurement solution itself and the portfolio of catalogues it would need to support. Using cost-benefit analysis, the firm should be able to identify and justify the different items that constitute the total cost of ownership: functionalities of the software package; technical architecture; installation costs; service and support; and other post-acquisition costs (including all hidden costs).

7 Implications and future research

The value of the CSFs is demonstrated by their ability to predict the e-procurement success. Hence, organisations ought to understand the technology plans of their preferred suppliers and their ability to support e-procurement initiatives. Subsequently, the firm should involve suppliers whom it has selected to conduct e-procurement within its planning activities. However, prior to implementing the e-procurement package, the firm should determine, implement, and maintain the appropriate business rules that will govern the way the solution will function. So deliberate and intelligent planning for the e-procurement initiative that capitalises on co-opting suppliers, designing the appropriate business rules for the software application, and mining the data gathered by the e-procurement system may lead to obtaining higher levels of total value received from the supplier.

The power of e-procurement comes from reengineering the business processes that surround it not from the implementation of a software solution. PDE's should understand the changing business practises and organisational behaviour related to e-procurement. So assigning accountability is key in organisational visibility in terms of Individual and unit spending for better understanding of spending patterns. After an e-procurement package has been adopted, management needs to enforce on-contract buying from preferred suppliers to optimise the initiative. When the package is installed and starts gathering data, the firm should analyse purchasing behaviour of its end users to ensure that its savings goals are met. measures used in the study:

- 1 the firm's satisfaction with the specific supplier's performance in terms of product quality; delivery performance; sales, service, and/or technical support; and total value received from this supplier
- 2 the firm's satisfaction with the specific supplier
- 3 the firm's overall satisfaction with the e-procurement system used.

Possible directions for future research would be to investigate how the CSFs are able to predict the success of different types of e-procurement initiatives utilising a variety of business models and digital environments.

Acknowledgements

We would like to express thanks to the anonymous reviewers who put a lot of effort in reading this manuscript. The comments given were very helpful in improving the quality of the paper at its later stage.

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