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Critical Success Factors Affecting E-Procurement Adoption in Public Sector Organizations in Sri Lanka

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Abstract

E-procurement is one of the Information Communication Technology (ICT) applications utilized in both public and private sector organizations. Many countries all over the world including Canada, Korea and Philippine benefited through the government procurement using electronic means as it enables the government to offer more convenient and widespread accessible government services in an efficient, cost-effective and participatory manner. The main objectives of the study are (a) to access the level of e-procurement usage in the public-sector in Sri Lanka; (b) to identify the significant factors affecting the public-sector e-procurement adoption in Sri Lanka; and (c) to identify the barriers in adopting e-procurement in those organizations. The population of the study comprises of the national level public sector entities such as; Ministries, Departments, Statutory Boards and Public Companies. A sample of 114 officers who involved in the procurement function was selected as key informants based on stratified random sampling method. 74 officers were responded for the study. Both qualitative and quantitative methods were utilized in this study. Quantitative data were collected through a structured questionnaire to identify the determinants of successful e-procurement adoption and the level of e-procurement usage. The qualitative data were collected through 10 interviews to identify barriers in e-procurement adoption. The study

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found that Relative Advantage, Compatibility, Complexity, Top Management Support, Employee Knowledge and skills and Supplier Readiness are statistically significant (at $p<0.01$) determinants of e-procurement adoption. These variables altogether explain 66.2% of variance in e-procurement adoption in the public-sector organizations in Sri Lanka. Among them, Top Management Support and Employee Knowledge are the major determinants of the successful e-procurement adoption. Weak procurement guidelines, Weak Legal framework and ICT infrastructure, and Lack of IT knowledge and experience of employees are the present barriers to e-procurement adoption in public sector organizations in Sri Lanka. Finally, policy recommendations for the e-procurement adoption are proposed.

Keywords

Critical success factors; E-procurement adoption; National level public sector organizations

Introduction

In the globalized world, the usage of Information and Communication Technology (ICT) has been intensified in both public and private sector organizations. It is a known fact that in competitive business environment, organizations either in government or private ownership seeks to maximize capabilities and resources properly to increase productivity. In this regard, ICT facilitates to explore new business opportunities while accelerating competition among businesses all over the world. E-procurement is one of the latest technologies utilized by modern day organizations in order to reduce time, cost and effort (Baternburg, 2007). E-procurement has evolved into the use of electronic technologies to streamline and enable procurement activities of an organization. Many countries all over the world have gained benefits through the application of e-procurement systems into their business operations.

Sri Lanka in its development agenda identifies, ICT as a key driver in economic development (ICT Policy, 2015). However, e-procurement is a new phenomenon to the most government sector organizations in the country. Moe (2004, cited in Baternburg, 2007) states that in contrast to the business organizations, the adoption of e-procurement systems by the governments are more influenced by political and institutional commitments. Different studies

have suggested that the real challenge of the public e-procurement adoption is not technical but managerial (e.g. Ramanathan & Somasundaram, 2004). Hence, adoption of e-procurement in the public sector is challenging. Liyanage (2005) identified several weaknesses of the Sri Lankan government procurement system such as extensive delays in contract awards and non-compliance with rules and regulations (cited in Samarasinghe, 2009). According to a preliminary discussion with Algama (2017) some of the contracts appear to have been awarded without observing the fundamental principles of governance in procurement such as transparency, accountability and value for money. Verité (2016) pointed out that introducing an efficient procurement system will empower the businesses and reduce wastage in public funds in public procurement in Sri Lanka. These factors highlight the importance of moving into automated systems of procurement function in Sri Lanka. Despite the fact that adaptation of e-procurement is significant but challenging, it is needed to examine the critical success factors that affect the adaptation of e-procurement in government sector organizations in Sri Lanka as the current literature in this regard is silent.

Literature Review

Procurement

Procurement means acquiring of goods and services and is a business-to-business (B2B) transaction. Procurement guidelines (2006) issued by the National Procurement Agency in Sri Lanka, define procurement as "obtaining by procuring Entities of Goods, Services or Works by the most appropriate means, with public fund or funds from any other source whether local or foreign received by way of loans, grants, gifts, donations, contributions and similar receipts" (p. 05).Government procurement is the process by which government buys goods and services from suppliers (from both public and private) for the needs of its people (Cardapan Antonio,2003, cited in Samarasinghe, 2009).

Government Procurement in Sri Lanka: Procurement guidelines and the procurement manual issued by National Procurement Agency (NPA) in 2006, for goods and works are the main compliances that need to be adhered in government procurement in Sri Lanka. Procurement methods used in government procurement have been specified in the procurement guidelines issued in 2006.

Weaknesses of Traditional Procurement in Sri Lanka: Government Procurement in Sri Lanka requires adhering to many rules and regulations according to the procurement guidelines issued by the National Procuring Agency in 2006. Liyanage (2005) discussed several weaknesses in government procurement of Sri Lanka as extensive delays in awarding contracts and non-compliance to rules and regulations. This has been exacerbated by frequently changing suppliers, poor monitoring, inadequate knowledge and skills, lack of expert advice and institutional support, non-availability of standard contract documents and specifications and weak contract administration (cited in Samarasinghe, 2009). This has direct negative consequences on critical economic development (Samarasinghe, 2009). Delays in procurement process are the major concerns which hinder the performance of government organizations.

E-Procurement: Electronic procurement is the use of information and communication technology (especially internet) by organizations for concluding their procurement relationships with suppliers and for acquisition of goods and services. Lusons & Gillingham (2003, cited in Samarasinghe, 2009) defined electronic procurement as the combined use of information and communication technology to enhance the internal and external purchasing and supply management processes.

Electronic Government Procurement in Sri Lanka: The usage of electronic methods in procurement function in public sector organizations in Sri Lanka is at minimal level. Procurement guidelines (2006) have given few provisions to facilitate adopting e-procurement. Any procuring entity who wishes to carry out procurement by means of electronic form has to obtain prior concurrence from the Procurement Committee. Procurement guidelines allow procuring entities to publish procurement invitations on website; to inspect pre-qualification applications and bidding documents electronically or otherwise; to obtain clarifications through electronic media. However, electronic submissions of bids are not allowed.

E-Procurement Functionalities: Lefebvre et al., (2005) classified e-procurement functionalities in detail considering information and transaction perspective as a part of B2B e-commerce study (cited in Hassan, 2013). As per their findings, searching for new suppliers and searching for goods and services is considered as “electronic information search”; purchasing via e-catalogues, placing and managing orders with suppliers and accessing suppliers’ goods or

services database as "simple electronic transactions", purchasing via e-auctions, e-tenders, negotiating contracts with suppliers, making payments to suppliers, accessing suppliers' inventories and allowing suppliers to access the buyers' inventories as "complex electronic transactions"; and sending documents to suppliers, doing collaborative online engineering with suppliers' and tracking goods purchased during transportation as "electronic collaboration" (Lefebvre et al., 2005, cited in Hassan, 2013).

Theoretical Background of E-Procurement

This study reviewed several related theories, namely, Diffusion of Innovation (DOI) theory (Oliveira, 2011), Resource Based View (RBV) theory (Soares-Aguiar & Palma dos- Reis, 2008), Network Effect Theory (Teo et al., 2009), Institutional Theory (Soares-Aguiar & Palma dos- Reis, 2008), Path Dependency Theory (Hassan, 2013) and Technology, Organization and Environment Context (TOE) Framework (Soares-Aguiar & Palma dos- Reis, 2008).

Oliveira (2011) mentions DOI and TOE framework are the most commonly used models on IT adoption at the firm level and most studies on IT adoption at the firm level are derived from these two theories. Soares-Aguiar & Palma dos-Reis (2008) explicitly relied on the TOE framework, institutional theory, and RBV theory to formulate hypotheses regarding factors affecting e-procurement adoption. Results of the study reveal that firm size, industry and top management support from the organizational context, information technology infrastructure, information technology expertise, Business to Business (B2B) know-how from technological context, perceived indirect benefits, perceived success of competitors and trading partner readiness from environmental context are positively and significantly associated with the e-Procurement adoption. Teo et al., (2009) explicitly relied on TOE framework in order to formulate hypotheses regarding factors affecting e-procurement adoption.

DOI theory, RBV theory, Network Effect Theory, Institutional Theory and Path Dependency Theory were compared with the TOE framework to eliminate the redundant variables (Hassan, 2013). According to the comparison, technological context is addressed by both DOI and RBV theory. Organizational context is addressed by DOI theory, RBV theory and path dependency theory.

Mohammadi (2001) conducted a study on Ranking of Critical Success Factors of e-procurement implementation based on thirty-five (35) previous research studies. Out of the top ten factors, the most critical factors are synonym with the information technology adoption theories. Accordingly, top management commitment and trained and skillful employees are similar to the organizational context in the TOE framework; Security, IT infrastructure and resources are similar to the technology context in TOE framework and RBV theory.

Vaidya et al., (2006) assert that there are a number of requirements relating to the adoption of an e-procurement system. They include technology, objectives, information, staffing and skills. Birks et al., (2001), considers the determinants of e-procurement success such as; staff training; top management support; users and buyers; selection of the actual e-Procurement system (cited in Vaidya et al., 2006).

Mose et.al. (2013) suggested five most critical factors which affect e-procurement adoption among large scale manufacturing firms in Kenya. Accordingly, employees and management commitment is the most significant critical factor for e-procurement adoption. E-procurement 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 (Birks et al., 2001, cited in Vaidya et al., 2006).

Based on the above discussion of the literature, the objectives of the paper are derived as follows.

1. To access the level of e-procurement usage in the public-sector in Sri Lanka.
2. To examine the critical success factors in adopting e-procurement in public sector organizations in Sri Lanka.
3. To identify barriers in adopting e-procurement in public sector organizations in Sri Lanka.

Based on the discussion of the literature review the following Hypotheses are derived;

H1: Higher the perceived relative advantage among the procuring officers, the more the organization will adopt e-procurement.

H2: Higher the perception of compatibility, the more the organization will adopt e- procurement

H3: Higher the perception as fewer complexes in e-procurement technology, the more the organization will adopt e-procurement

H4: Higher the support from top management, more the organization will adopt e- procurement

H5: Higher the employee knowledge and skills on information technology, more the organization will adopt e-procurement

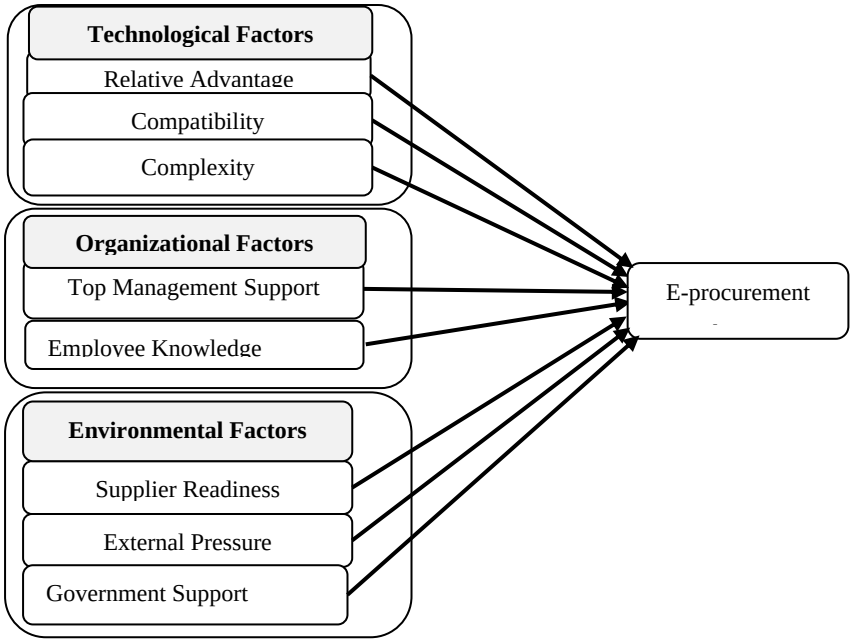
H6: Higher the supplier is willing to engage in e-procurement; more the organization will adopt e-procurement

H7: Higher the external pressure, the more the organization will adopt e - procurement

H8: Higher the government support, more the organization will adopt e-procurement

The conceptual framework of the study has been depicted in the following Figure 1.

Figure 1: Conceptual Framework



Methodology

This study employed quantitative data for identifying factors affecting e-procurement and the level of e-procurement usage while using qualitative data for identifying the barriers for e-procurement adoption in the public sector organizations in Sri Lanka. The population of the study comprised of national level public sector organizations; Government Ministries, Departments, Statutory Boards and Public Companies. The unit of analysis of the study was "national level public sector organizations" and the key informant is the person who have been entrusted the duties of procuring activities of the organization. The population of the study is the national level public sector organizations in Sri Lanka and 114 organizations were considered as the sample which is 39% of the population. Of that, 74 responses were received with a response rate of 65%. Stratified random sampling method was used. The sample was selected proportionately to each stratum in order to represent the entire sector. Respondents were informed that any information given is completely confidential, or anonymous to avoid non-response bias.

Table 1: Sample Selection

Category	Population	Sample
Ministries	72	28
Departments	75	30
Statutory Boards	141	56
Public Companies	01	00
Total	**289**	**114**

Data of the study was collected through the questionnaires and from the interviews conducted with officials in the sample. All independent variables and dependent variable were derived from the literature. There are eight independent variables, namely, Relative Advantage, Compatibility, Complexity, Top Management Support, Employee Knowledge, Supplier Readiness, External Pressure and Government Support. The dependent variable is the e-procurement adoption. Operationalization of the research variables are shown in the Table 2.

Table 2: Operationalization of the Research variables

Variable	Definition	Dimensions	Indicators
Dependent variable			
E-procurement adoption	The rate at which the innovation (e-		• Users aware of the e-

	procurement system) spreads through the members of the social system (Rogers, 2003).		Procurement system (Rogers, 2003). • Users of the organization accept the e-Procurement system (Rogers, 2003). • Users willing to use e-procurement system (Rogers, 2003). • Users use e-procurement system (Rogers, 2003).
Independent Variables Relative advantage	Organizations adopt and use an innovation only when they perceive the potential benefits of using the innovation (Rogers, 2003)	Users perceive the benefits of using e-procurement	• E-procurement makes the procurement activities faster (Teo et al., 2009) • E-procurement facilitates better management of organization's purchasing activities (pbdullah, 2009, cited in Hassan, 2013) • E-procurement improves relationship with suppliers (Teo et al., 2009) • E-procurement reduces the operational costs

			(Teo et al., 2009)
Compatibility	Organizations are more likely to adopt and use technology that is compatible with the organizations' existing information technology infrastructure, business processes and value systems. (Teo, et al., 2007)	Compatible with Organization's existing information technology infrastructure	• E-procurement adoption is consistent with our existing information technology infrastructure (Teo & Pian, 2003, cited in Wan et al., 2016) • E-procurement is a new business experience for our organization (Karahanna et al., 2006, cited in Hassan, 2013)
		Compatible with Organization's existing purchasing processes	• E-procurement adoption fits our organization's preferred way of conducting our purchasing activities (Karahanna et al., 2006) • E-procurement adoption is similar with our organization's current purchasing process (Karahanna, et al., 2006)
		Compatible with organization's strategy	• E-procurement adoption is consistent with our business

			strategy (Teo & Pian, 2003)
		Compatible with Organization's values	• E-procurement adoption is consistent with our organizational values and beliefs (Teo & Pian, 2003)
Complexity	An innovation that is perceived by as easy to use and to understand is more likely to be adopted and used by an organization (Rogers, 2003)	Easy to learn e-Procurement	• Learning to operate e-procurement is easy (Grandon & Pearson, 2004, as cited in Wan et al., 2016)
		Easy to understand e-Procurement	• Interactions with e-procurement are clear and understandable (Grandon & Pearson, 2004)
		Easy to use e-Procurement	• E-procurement is flexible to interact with the user (Grandon & Pearson, 2004) • It is easy to become skillful at using e-procurement (Grandon & Pearson, 2004) • E-procurement is easy to use (Grandon & Pearson, 2004)
Top Management	The executive management team	Top	• Top management

Support	is responsible for setting goals, bringing about collective commitment for change in process and organizational structures, and formulating the policies and strategies necessary to put an e-Procurement initiative in place (WB, 2003).	management sets the vision and goals to adopt e-Procurement	considers e-procurement adoption as important to the organization (Teo & Pian, 2003) • Top management considers e-procurement as a part of business strategy (Teo & Pian, 2003) • Top management sets goals to achieve e-procurement (Teo & Pian, 2003)
		Top management committed as change agent in e-Procurement adoption	• Top management is committed to use e-procurement (Teo & Pian, 2003) • Top management is willing to change organizational structure required for e-procurement adoption (Teo & Pian, 2003) • Top management is willing to change existing processes as required for e-procurement adoption (Teo & Pian, 2003)
		Top	• Top management formulates policies to adopt

		management formulates policies and strategies to adopt e-Procurement	e-procurement (Teo & Pian, 2003) • Top management formulates the strategies necessary to adopt e-procurement (Teo & Pian, 2003)
Employee Knowledge	Organizations are more likely to adopt and use a technology when their employees have knowledge and expertise relevant to technology. (Hassan, 2013)	Employee knowledge on information technology	• Our employees have an overall knowledge about e-procurement (Lee, 2009) • Our employees would use e-procurement more if they knew more about what it can do for our organization (Looi, 2pp5, as cited in Hassan, 2013)
		Employee expertise on e-Procurement	• Our employees have the technical knowledge to use e-procurement (Looi, 2005, cited in Hassan, 2013)
Supplier readiness	Partners are ready to engage in information	Suppliers willing to participate in e-Procurement	• Suppliers willing to change for automated processes (Chwelos et al., 2001)

	exchanges or transactions via e – procurement (Hassan, 2013).		• Suppliers trust organization's e-procurement system (Chwelos et al., 2001)
Government support	Political commitment towards the successful implementation and enforcement of the e-procurement through approved laws necessary for the accomplishment. (Ermal. et al., 2012)	Political commitment towards e-procurement adoption	• Government policies identified e-procurement as a goal (Alatawi, et al., 2012, cited in Ismail et al.,2016) • Government actions taken to adopt e-procurement (Hewage et al., 2012)
		Legal framework	• Strengthen legal framework for e-procurement adoption (Hewage et al., 2012)
External Pressure	The adoption of IT can be the consequence of pressure and support exerted on the enterprise by its environment (Ismail et al., 2016).	Pressure to adopt e-procurement by the environment	• There is pressure from the international organizations including donors to use e-procurement (Premakumar & Ramamurthy, 1995) • We believe we will lose our suppliers if we do not use e-procurement (Premakumar &

	Ramamurthy, 1995) • There is pressure from government to use e-procurement in purchasing (Premakumar & Ramamurthy, 1995)

All variables were measured by using a five-point Likert scale and the respondents were asked to rate each item on the scale. The scales were given in the questionnaire in a continuum representing Never (1) to Always (5); to determine the level of e-procurement usage and Strongly Disagree (1) to Strongly Agree (5) to identify the factors affecting e-procurement adoption. Both descriptive statistics and inferential statistics were used for quantitative data analysis. Correlation analysis and regression analysis were used to examine the relationship and the determinants of e-procurement adoption.

Qualitative data was gathered from the interviews conducted with the officers who are directly involved in the procurement function of the organization and through the questionnaires. Ten un-structured interviews were conducted. Open ended questions were asked from the interviewees to obtain the true view of the existing phenomenon. Collected data was recorded and sorted into meaningful categories. The results were interpreted and reviewed with the existing literature. Content analysis employed to analyze data to identify the basic patterns and themes related to issues of e- procurement adoption.

Validity and Reliability of Measures

To maintain the internal consistency of measures Composite Reliability (CR) and Average Variance of Extracted (AVE) were computed. To ensure CR for the construct, the value should be greater than 0.6 and AVE should be greater than 0.5 (Fornel and Larker 1981). As Table 3 and Table 4 indicate these criteria were met ensuring the internal consistency of the measures.

Validity

Table 3: Results for Validity Measures: Dependent Variable

Item	Alpha	Absolute Loading*
E-procurement Adoption	**.857**	
Employees aware on automated processes in procurement function		.852
Employees accept fully automated e-Procurement system		.842
Employees use existing e-Procurement system		.859
Employees willing to use fully automated e-Procurement system		.794
Total Variance Explained – 70.116%		
Initial Eigenvalues – 2.805		
AVE .701		
CR .904		

Table 4: Results for Validity Measures: Independent Variables

Item	Alpha	Absolute Loading*
Relative Advantage	**.873**	
RA 01- E-procurement makes the procurement process faster		.955
RA 02- E-procurement facilitates better management of purchasing function		.934
RA 03- E-procurement improves relationship with suppliers		.817
Total Variance Explained – 81.731%		
Initial Eigenvalues – 2.452		
AVE .817		
CR .930		
Compatibility	**.919**	
E-procurement system appropriate with existing information technology infrastructure		.857
E-procurement system appropriate with organization's preferred way for conducting purchasing activities		.913
E-procurement adoption is consistent with organization's business strategy		.886

E-procurement adoption is consistent with organization's value	.940
Total Variance Explained – 80.923%	
Initial Eigenvalues – 3.237	
AVE .809	
CR .944	

Complexity	**.712**
Learning to operate e-procurement is easy	.710
Interaction with e-procurement system is clear	.647
e-Procurement is flexible to interact with	.740
Easy to become skillful at using e-procurement	.851
Total Variance Explained – 54.865%	
Initial Eigenvalues – 2.195	
AVE .548	
CR .828	

Top Management Support	**.878**
Top management considers e-procurement adoption is important	.890
Top management considers e-procurement adoption as a part of business strategy	.982
Top Management is willing to take risks involved in the adoption of e-procurement	.933
Top Management sets goals to achieve e-procurement	.835
Top Management is committed to use e-procurement	.857
Top Management is willing to change organizational structure required to adopt e-procurement	.675
Top Management is willing to change business processes required to adopt e-procurement	.517
Top Management is capable of formulating policies required to adopt e-Procurement	.555
Total Variance Explained – 60.078%	
Initial Eigenvalues – 4.806	
AVE .636	
CR .930	

Employee Knowledge	**.851**	
Employees aware on process improvements		.852
Employees have an overall knowledge on e-procurement		.924
Employees have technical knowledge to start e-procurement		.864
Total Variance Explained – 77.519%		
Initial Eigenvalues – 2.326		
AVE .775		
CR .911		
Supplier Readiness	**.738**	
Suppliers willing to automate supply process		.792
Suppliers trust organization's system		.908
Suppliers have automated systems		.749
Total Variance Explained – 67.109%		
Initial Eigenvalues – 2.013		
AVE .671		
CR .858		
External Pressure	**.936**	
Organization is forced to e-procurement to meet suppliers requirements		.969
Pressure to use e-procurement as a standard purchasing practice		.969
Total Variance Explained – 93.95%		
Initial Eigenvalues - 1.879		
AVE .939		
CR .968		
Government Support	**.936**	
Government is supportive to adopt e-procurement		.865
Legal framework is sufficient to adopt e-procurement		.865
Total Variance Explained – 74.796%		

Initial Eigenvalues – 1.496
AVE .747
CR .855

**Absolute loading of .50 or higher were significant*

Analysis of Data

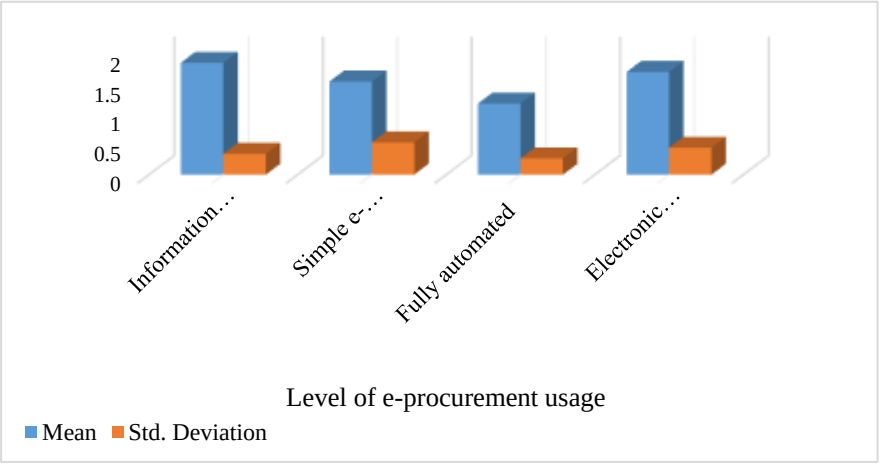
Demographic Characteristics of the Sample

Demographic characteristics were considered for age, gender, educational and professional qualifications, and working experience. Majority of the respondents in the sample are male (55%) and 42% of the sample is within the age range of 31-40. Highest responses (42%) received from the Ministries category. 49% of the respondents are graduates and about 36% of the sample has fully qualified professional examinations and 65% of the respondents possess a range of two to four years' experience in the procurement function.

Level of Automation in Procurement Process

The study examined the current level of Information and Communication Technology usage under four categories as "Information search and exchange", "Conducting simple e-procurement transactions", "Fully automated e-Procurement transactions" and "Electronic collaboration in e-Procurement".

Figure 2: The level of e-procurement usage in the national level public sector organizations



According to the results in Figure 02, mean value of all four levels is below 2.33 indicating lower level in using electronic methods in their procurement function.

Before analyzing the regression model, Multicollinearity analysis performed to identify how much the variance of an estimated regression coefficient increases if the predictors are correlated. VIF is the collinearity statistics utilized to measure the impact of Multicollinearity among variables. As Denis (2011) has mentioned, If VIF for one of the variables is around or greater than 5, there is Multicollinearity associated with that variable (cited in Bush, 2009).

Table 5: Results of Multicollinearity

Model	**Collinearity Statistics**	
	Tolerance	**VIF**
(Constant)		
Relative Advantage	.201	4.595
Compatibility	.462	2.166
Complexity	.668	1.496
Top Management Support	.282	3.543
Employee Knowledge	.274	3.654
Supplier Readiness	.201	4.180
External Pressure	.246	4.061
Government Support	.325	3.081

According to the test results in Table 5, there is no Multicollinearity issue in the model.

Key Factors for Adaptation of e-Procurement

Table 6: Regression Analysis

Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	2.271	1.117		2.032	.046
Relative Advantage	.602	.219	.419	2.752	.008
Compatibility	.218	.103	.213	2.127	.037

Complexity	.341	.119	.239	2.873	.005
Top Management Support	.702	.159	.566	4.419	.000
Employee Knowledge	.705	.130	.705	5.422	.000
Supplier Readiness	-.917	.243	-.573	-3.776	.000
External Pressure	-.059	.164	-.049	-.358	.722
Government Support	-.038	.136	-.034	-.282	.779

Dependent Variable: E-Procurement adoption

Beta Coefficient in the Table 6 explains the impact of the independent variables on the dependent variable. Considering the relative importance of the independent variables in predicting the dependent variable, Employee knowledge and skills has the most impact on e-procurement adoption having beta value of 0.705.

Employee knowledge and skills, Compatibility, Complexity, Relative Advantage, Top Management Support, Supplier Readiness are significantly affecting e-procurement adoption. External pressure and government support are not significantly affecting the e-procurement adoption.

Table 7: Model Summary

Model	R	R Square	Adjusted Square	RStd. Error ofDurbin –Watson the Estimate	
1	.836	.699	.662	.49172	2.144

Predictors: (Constant), Government Support, Complexity, Supplier readiness, External Pressure, Compatibility, Top Management Support, Employee knowledge and skills

Dependent Variable: E-Procurement adoption

According to the Table 7, 66.2% of the variation in e-procurement adoption can be explained by six independent variables (Employee knowledge and skills, Compatibility, Complexity, Relative Advantage, Top Management Support, and Supplier Readiness) in the model.

Barriers for Adaptation of e-Procurement

Following specific issues were identified as barriers for adaptation of e-procurement.

Weak Procurement Guidelines

The majority of the respondents highlighted the weaknesses in the existing procurement guidelines. Procurement guidelines obstruct moving into automated systems in procurement function as suppliers are not allowed to submit bids in electronic form, purchasing via e-auctions or e-tenders, making payments electronically and sending documents to suppliers in electronic means. The same issue was highlighted by the responses received through questionnaires. Accordingly, 88% of the respondents mentioned that strengthening and revising existing guidelines is a must to facilitate e-procurement adoption.

Weak Legal framework

From the interviewees four officers discussed the weaknesses in the existing legal framework of the country to adopt e-procurement. Laws and regulations facilitating electronic transactions and other IT related laws can be identified as the major constraint in establishing an e-procurement system. It was revealed that in the long term, absence of a national procurement law will diminish the stakeholders' trust, transparency, accountability and efficiency in procurement operations. Implementation of Electronic Transactions Act, No. 19 of 2006 and Computer Crime Act, No. 24 of 2007 are some of the positive tendencies on creating legal framework in the country. The law should be revisited to facilitate the implementation of e-procurement systems. 53% of the respondents highlighted that there is a weakness of IT related laws.

ICT Infrastructure

Along with the strengthening legal framework, ICT infrastructure is required to facilitate those acts and regulations should be established and maintained. All interviewees mentioned that existing ICT infrastructure does not facilitate in adopting e-procurement systems in their organizations. 95% of the respondents confirmed the same issue through the responses received from the questionnaire. As e-procurement System is highly relying on cryptography to establish Confidentiality, Integrity and Availability, it is required relevant cryptographic protocols, algorithms and techniques to establish a secure e-procurement system. Standard Bidding Documents (SBD) should be modified and standardized to facilitate use of e-procurement. According to the respondents, lack of Public Key Infrastructure (PKI) facilities is a key barrier in determining e-procurement adoption.

Lack of IT knowledge and experience

Lack of IT knowledge and experience among public sector officials appeared as a key issue in e-procurement adoption. Initiation of such a change would be challengeable without sufficient knowledge on IT. Officials engages in procurement function does not know on laws and regulations facilitating electronic transactions and other IT related laws. 81% of the respondents highlighted the issue through the questionnaires.

Discussion

Relative Advantage, Compatibility, Complexity, Top Management Support, Employee knowledge and Supplier readiness are critical determinants of e-procurement adoption in public sector organizations in Sri Lanka. Relative advantage was found to have effect on e-procurement adoption in the studies by Min and Galle (2003), Teo et al. (2009), Li (2008), Hassan (2013), Soares-Aguiar & Palma Dos-Reis (2008).

Organizations are more likely to adopt and use innovation when it is compatible with their existing practices and values (Rogers, 2003). Teo et al., (2009) and Soares-Aguiar & Palma-Dos-Reis (2008) presented evidence suggesting that organizations are more likely to adopt and use technology that is compatible with the organizations' existing information technology infrastructure, business processes and value systems.

An innovation that is perceived as easy to use and understand is more likely to be adopted and used by an organization (Rogers, 2003). The author further suggested that organizations are more likely to adopt and use technology that is perceived as fewer complexes. Difficulty in understanding and applying a new technology increases the risk associated with its adoption (Teo, et al., 2009).

Top Management support is a critical factor in both e-procurement implementation and adoption as identified by some scholars. Support from top management is vital to ensure that resources needed to adopt a technology (Griver, 1993, as cited in Hassan, 2013) or to expand its use are available and to overcome resistance to change.

Employee knowledge is more likely to result in e-procurement adoption. Prior studies presented evidence that organizations are more likely to adopt and use technology when their employees have knowledge and expertise relevant to

technology. Mata et al., (1995) illustrate that knowledge about technology enables organizations to manage effectively the risks associated with investing in a technology (cited in Hassan, 2013). The findings are associated with the qualitative findings revealed through the interviews conducted with the officers of public sector organizations.

The benefits of e-procurement can be realized by an organization only if its suppliers are ready to engage in information exchanges or transactions via procurement (Hassan, 2013). Soares-Aguiar & Palma-Dos-Reis (2008) presented evidence that organizations are more likely to adopt and use inter-organizational information systems when their trading partners are ready to use such systems. However, supplier readiness has a negative relationship with e-procurement adoption due to suppliers' unwillingness to trust electronic systems in public sector organizations.

In Sri Lanka, most of the supplier contracts depend on personal relationships and have been awarded without observing the fundamental principles of governance in procurement (Verité, 2016). Therefore, both buyer and seller do not wish to maintain electronic business relationships. ECOM (2002) provides constructive opinion on the same stating that suppliers may be unwilling to conduct businesses electronically with public sector agencies because they are unclear about the benefits to be gained, and they might see e-procurement as a means by which public sector agencies will simply attempt to force down prices.

Managerial Implications

E-procurement adoption is possible when the users of the organization perceive its benefits such as performing procurement process faster, better management of procurement activities and improving relationship with suppliers. Therefore, users should make aware on the expected benefits of adopting e-procurement system.

E-procurement systems should be compatible with the existing information technology infrastructure. Then the additional cost and training can be minimized as users familiar with the existing information technology infrastructure. Users preferred method of doing their day to day activities should not diverge with the new e-procurement systems. End user participation is required from the beginning of such implementation to avoid resistance. E-

procurement systems should be easy to learn and operate for end users. It should be provided with user friendly interface to interact with.

Top management support is a vital factor on e-procurement adoption. They should perceive moving to an automated solution is important to the organization and they should set goals and formulate policies necessary for e-procurement adoption. To accomplish the goal, they should identify e-procurement system adoption as a part of their business strategy and they should be willing to change necessary changes required in the present organizational set up and business processes.

Employee knowledge and skills is another supportive hypothesis for e-procurement adoption. Employee should make aware of the process improvements and changes to the existing processes. User Acceptance Testing (UAT) should be conducted before implementation of e-procurement systems.

Supplier readiness to perform purchase contracts based on automated process is another factor on e-procurement adoption. As it is negatively correlate with e-procurement adoption in Sri Lankan context, suppliers should be involved in every stage of e-procurement adoption by demonstrating the proposed solution to supplier by discussing necessary changes, issues and concerns.

Updating procurement guidelines, manuals and procurement procedures and adopt a principles-based procurement law are imperative requirements in order to speed up e-procurement adoption.

Conclusion

This study makes a significant contribution to the applicability of e-procurement adoption theories to the public-sector organizations in Sri Lanka. Accordingly, technology and organization context variables were significantly affecting e-procurement adoption in public sector organizations in Sri Lanka. Employee IT knowledge and experience and IT infrastructure also compatible with the complexity in the technological environment and employee knowledge and skills in the organizational context. However, Supplier readiness from the external environment has a negative impact on e-procurement adoption.

Therefore, top managers should more concern about organizational level factors to strengthen those factors. Top management support and employee

knowledge have the highest impact on e-procurement adoption in the organizational context. As suppliers' readiness negatively effects on e-procurement adoption, managers should provide opportunities for them to offer their feedback and suggestions for the improvement and adjustment of practices. E-procurement adoption is possible when the users of the organization perceive its benefits such as performing procurement process faster, better management of procurement activities and improving relationship with suppliers. Therefore, users should make aware on the expected benefits of adopting e-procurement system.

References

Algama, P, 2017. Sri Lanka: Ensuring good governance in public procurement. [online] Available at: https://wbnpf.procurementinet. org/featured /ensuring-good-governance-procurement-sri-lanka [Accessed on 23/07/2017].

Baternburg, R, 2007. E-procurement adoption by European firms: A quantitative analysis. *Journal of Purchasing & Supply Management*, [online]. Vol. 13 (3), pp 182-192. Available at: http://www.sciencedirect.com/science/article/pii/S1478409207001021 [Accessed on 05/02/2015].

Bush, M.D, 2009. A Quantitative Investigation of Teachers' responses to Bulling, [Online] Available at: https://dspace.iup.edu/bitstream/handle/2069/179/Michael%20Bush.pdf? Sequence =1 [Accessed on 12/10/2017]

Chwelos, P., Benbasat, I and Dexter, A. S. 2001. Research report: Empirical test of an EDI adoption model, Information Systems Research, Vol 12 (3), pp 304-321.

ECOM group, 2002. e-Procurement in the UK Public Sector: A guide to Development and Best Practices. London, UK

Ermal, E et al, 2012, Efficiency Evaluation of the Public E-Procurement system in the reduction of corruption: The Albanian Case. Available from: https://www.scribd.com/document/152248751/Elezi-Harizaj(Accessed on 03/02/2015)

Fornell, C. & Larcker, D. F. 1981. Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, Vol 18(1), pp 39-50. Available at: http://www.jstor.org/stable/3151312 [Accessed on 26/11/2020]

Grandon, E., & Pearson, J. 2004. E-Commerce Adoption: Perceptions of Managers/Owners of Small and Medium Sized Firms in Chile. *Communications of the Association for Information Systems*, Vol.13, pp 81-102. Available at: https://doi.org/10.17705/1CAIS.01308. [Accessed on 09/08/2017]

Hassan, H, 2013. Factors affecting the extent of e-procurement use in small and medium enterprises in New Zealand, [online] Available at: https://muir.massey.ac.nz/bitstream/handle/ 10179/4701/02_whole.pdf [Accessed on 08/06/2017].

Hewage D.L., & Senevirathne G.P., 2012. Implementation of an e-Procurement system for project procurement in Sri Lankan context. UCSC research symposium [online]. Vol. 5.pp.13-17.Available from: http://www.icter.org/conference/icter2016/sites/default/files /icter/UCSC%20Symposium%202012%20Proceedings.pdfpp.13-17. (Accessed on 08/07/2015)

ICT policy, 2015 [online]. Available from: https://www.gov.lk/elaws/wordpress/ wp-content/uploads/2015/03/eGov-Policy-structured-v4-0.pdf (Accessed on 14/07/2015)

Karahanna, E., Agarwal, R. and Angst, C.M., 2006, Reconceptualizing Compatability Beliefs in Technology Acceptance Research. *MIS Quarterly*. Vol. 30. pp 781-804. Available at: https://pdfs.semanticscholar.org/f596/6a113a306d8f98bbd6adf7c05772cb5d4175.pdf?_ga=2.250185542.110972872.1584077036-288110243.1583405460 [Accessed on 15/12/2016].

Lee, S. J., 2009. Online Communication and Adolescent Social Ties: Who benefits more from Internet use? *Journal of Computer-Mediated Communication.* Vol.14 (3), pp 509-531. Available at: https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1083-6101.2009.01451.x. [Accessed on 11/12/2016]

Li, Y.H, 2008. An empirical investigation on the determinants of e-procurement adoption in Chinese manufacturing enterprises. *International Conference on Management Science & Engineering* [online], Vol. 1 and 2, pp 32-37. Available at: DOI**:** 10.1109/ICMSE.2008.4668890 [Accessed on 12/11/2016].

Min, H, et al., 2003. E-purchasing: Profiles of adopters and non- adopters. *Industrial Marketing Management* [online]. Vol.32, pp227-233. Available form: https://doi.org/10.1016/S0019-8501(02)00266-3[Accessed on 15/12/2016].

Mohammadi, M.R. et al.,2001. Ranking of critical success factors of e-procurement implementation. *World sciences journal* [online], Vol.1 (7). pp. 203-214. Available at:http://www.irjabs.com/files_site/paperlist/r_1389_130914105707.pdf [Accessed on 23/08/2014]

Mose, J.M, 2013. The critical success factors and challenges in e-procurement adoption among large scale manufacturing firms in Nairobi, Kenya. *European Scientific Journal* [online]. Vol.9, No.13. Available at: https://eujournal.org/index.php/esj/article/view/1060 [Accessed on 12/07/2014].

Oliveira, T., Martins, M. F. 2011. Literature Review of Information Technology Adoption Models at Firm Level. *The Electronic Journal Information Systems Evaluation* [online], Vol.14 (1). Pp110- 121. Available at: www.ejise.com [Accessed on 01/12/2016].

Premkumar, G., & Ramamurthy, R. 1995. The Role of Interorganizational and Organizational Factors on the Decision Mode for Adoption of Interorganizational Systems. Journal of the Decision Sciences. Vol.26 (3). Pp303-336. Available at: https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1540-5915.1995.tb01431.x. [Accessed on 12/07/2014].

Procurement guidelines, 2006. National Procurement Agency, Sri Lanka.

Ramanathan & Somasundaram, 2004. Diffusion of E-Procurement in the Public Sector-Revisiting centralization versus decentralization debates as a twist in the tale. *ECIS conference proceedings*[online]. Available at: http://aisel.aisnet.org/ ecis2004/114/ [Accessed on 12/12/2016].

Rogers, E., 2003.*Diffusion of Innovations*. 5th ed. New York: NY: Free Press.

Samarasinghe, A.T.L.P., 2009. An Assessment on suitability of e-procurement for Sri Lanka Railways [online]. Available from: http://dl.lib.mrt.ac.lk/handle/123/216. [Accessed on 12/05/2015]

Soares-Aguiar, A., Palma dos- Reis, A, 2008.Why Do Firms Adopt E-Procurement Systems? Using Logistic Regression to Empirically Test a Conceptual Model.*IEEE Transactions on Engineering Management* [online]. Vol. 55 (1). pp 120-13. Available at: DOI: 10.1109/TEM.2007.912806 [Accessed on 23/12/2016].

Teo, T. S., & Pain, Y.,2003. A contingency perspective on Internet adoption and competitive advantage. European Journal of Information Systems, Vol.12 (2), pp 78-92. Available at: https://www.researchgate.net/publication/254299073_A_contingency_perspective_on_Internet_adoption_and_competitive_advantage [Accessed on 17/05/2017].

Teo, T.S.H et al., 2009. Adopters and non-adopters of e-Procurement in Singapore: An empirical study. *The International Journal of Management Science* [online]. Vol 37(5) Available at: https://www.sciencedirect.com/sciencearticle/pii/S0305048308001321 [Accessed on 23/34/2016].

Verité (research firm), 2016. Available at: http://www.lankabusinessonline.com/verite-identifies-weakness-in-sri-lankas-public-procurement/ [Accessed on 16/05/2017]

Vaidya, K, et al., 2006. Critical factors that influence e-procurement implementation success in the public sector, Journal of public procurement [online]. Vol.6, pp.70-99. Available at:

http://pracademics.com/attachments/article/444/e-ProSympAr6%20Vaidya%20etal.pdf [Accessed on 21/07/2014]

Wan Ismail, W.N. et al., 2016, Does Adoption of CAIS differentiate the SMEs Performance: Evidence in Malaysia. World Applied Sciences Journal [online] Vol.35 (9). Available from: http://www.idosi.org/wasj/wasj35(9)17/46.pdf (Accessed on 02/05/2017)

World Bank (WB), 2003, Electronic Government Procurement (e-GP); World Bank Draft Strategy, Washington, DC. Available from: siteresources.worldbank.org/ INTPROCUREMENT/.../eGPStrategyfortheWBword.doc. (Accessed on 16/05/2015).