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# A REVISED FRAMEWORK FOR EVALUATING THE PUBLIC VALUE OF E-GOVERNMENT

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## Abstract

*The concept of public value is becoming increasingly popular as the modern driver for the development of electronic government worldwide. As a result, adequately evaluating the public value of e-government becomes critical, exemplified by the development of several frameworks in this regard. These frameworks, however, suffer from various shortcomings for effectively evaluating the public value of e-government. This paper presents a revised framework for evaluating the public value of e-government based on a comprehensive review of the relevant literature. Structural equation modelling is used for empirically testing and validating the proposed framework based on the survey data collected in Sri Lanka. The study shows that quality of information, e-services, user-orientation of information and services, efficiency and openness of public organizations, equity, self-development of citizens, trust, and contributions of public organizations to the environmental sustainability are the important public values in e-government.*

*Keywords: Public value, e-Government, Evaluation, Structural equation modelling, Sri Lanka.*

## 1 INTRODUCTION

The concept of public value is becoming increasingly popular worldwide as an inclusive framework for assessing the performance of public services (Moore 1995; Kelly et al. 2002). The popularity of this concept is due to its capacity for assessing the benefits of public services to citizens (Kelly et al. 2002). Citizens derive value from the consumption of public services (Kelly et al. 2002). As a result, the public value should guide the delivery of public services, including those services delivered through electronic government (e-government) (Moore 1995; UNDESA 2003; Meynhardt 2009).

E-government has gone through several phases since its introduction for improving the performance of public services (Karunasena & Deng 2010). With the popularization of the public value concept in public services management, public value is increasingly becoming the innovative driver in modern e-government endeavours (Bonina & Cordella 2008). As pointed out by Castelnovo and Simonetta (2007), “public administration aims at producing value for citizens and the use of ICT to improve government is a means to improve the public value”. This shows that public value can be created through e-government. “People express preferences, the government uses ICT to enhance its own capacity to deliver what people want, and eventually a public value is created” (UNDESA 2003). In this regard, e-government can be defined as a process of creating public values using information and communication technologies (ICT) (UNDESA 2003).

The public value of e-government, however, has not fully materialised (Heeks 2008). As a result, various stakeholders start to question the value of their investment in e-government (Heeks 2008), leading to the development of several frameworks for evaluating the public value of e-government. Kearns (2004), for example, develops a framework for evaluating the public value of e-government based on the delivery of public services, achievement of socially desirable outcomes, and development of trust. Karunasena and Deng (2010) propose a framework for exploring the public value of e-government by considering the delivery of public services, achievement of outcomes, and effectiveness of public organizations. One common problem of these frameworks, however, is that the validity of the constructs in these frameworks and the relationships between the constructs are not empirically tested. It is, therefore, questionable to use these empirically untested frameworks for adequately evaluating the public value of e-government.

This paper aims to develop and validate a framework for effectively evaluating the public value of e-government. To demonstrate the validity of the proposed framework, structural equation modelling (SEM) is used based on the survey data collected in Sri Lanka. The study reveals that delivery of quality information, delivery of online services, user-orientation of online information and services, efficiency and openness of public organizations, equity, trust, self-development of citizens, and public organizations’ contribution to the environmental sustainability are the important public values in e-government. In what follows, a review of relevant literature is presented first, leading to the development of the conceptual framework, research methodology, and the presentation of the data analysis and the research findings.

## 2 EVALUATING THE PUBLIC VALUE OF E-GOVERNMENT

Public value is created by the government for citizens through the provision of public services (Kelly et al. 2002). Improving the quality of public service delivery, for example, produces public value (Kearns 2004). Operating an efficient public organization creates public value (Moore 1995). Achieving socially desirable outcomes produces public value (Kelly et al. 2002). There are many public values in a society, exemplified by the seventy-two kinds of public value based on 230 studies in the USA, the UK and the Scandinavian countries (Jorgensen & Bozeman 2007).

There are several frameworks for evaluating the public value of e-government in the literature. Kearns (2004), for example, proposes a framework for evaluating the public value of e-government based on the availability of e-services and information, take-up of e-government services, availability of choice, citizens' satisfaction on e-government services, level of importance of e-services to citizens, fairness of e-government services delivery, achievement of outcomes, and development of trust. The European Commission develops a framework based on the efficiency, democracy and effectiveness for examining the public value of e-government services (eGEP 2006). Golubeva (2007) proposes a framework for evaluating public value of e-government portals with the inclusion of citizen centricity, usability, openness, transparency and interactivity. Karunasena and Deng (2010) present a framework for evaluating the public value of e-government by considering delivery of public service, efficiency of public organizations, and achievement of socially desirable outcomes.

The frameworks as above, however, have various shortcomings. The framework of Kearns (2004), for example, identifies achievement of socially desirable outcomes through e-government as an important public value without showing how to measure it. The framework of the European Commission (eGEP 2006) is criticised for its bias towards e-administration and its failure to consider government's e-enabling of civil society and communities (Heeks 2008). The approach of Golubeva (2007) focuses only on the supply side of e-government. These frameworks fail to consider important public values such as quality information, organizational efficiency, equity, self-development of citizens and environmental sustainability. Furthermore, one common problem of the frameworks above including that of Karunasena and Deng (2010) is that the validity of the constructs and the underlying relationships between different constructs in these frameworks has not been empirically tested. To adequately address these issues, a new framework is proposed in the following.

### 3 A CONCEPTUAL FRAMEWORK

Sri Lanka launched the e-Sri Lanka program as the first national e-development program in 2002. Under the umbrella of e-Sri Lanka, the e-government development program was designed for providing its citizens with transparent, effective, and efficient public services. Five distinct but interdependent strategies are developed for facilitating the implementation of numerous e-government initiatives. To adequately evaluate the public value of these e-government initiatives, a framework shown as in Figure 1 is proposed by considering the nature of the e-government development in Sri Lanka. The proposed framework hypothesizes that the public value of e-government can be created by the delivery of public services (DPS), the efficiency of public organizations (EPO), and achievement of socially desirable outcomes (ASO). It is also hypothesized that public value created by e-government public services delivery is reflected by the value of (a) quality of information online, (b) delivery of e-services, (c) and user-orientation of e-government information and service delivery.

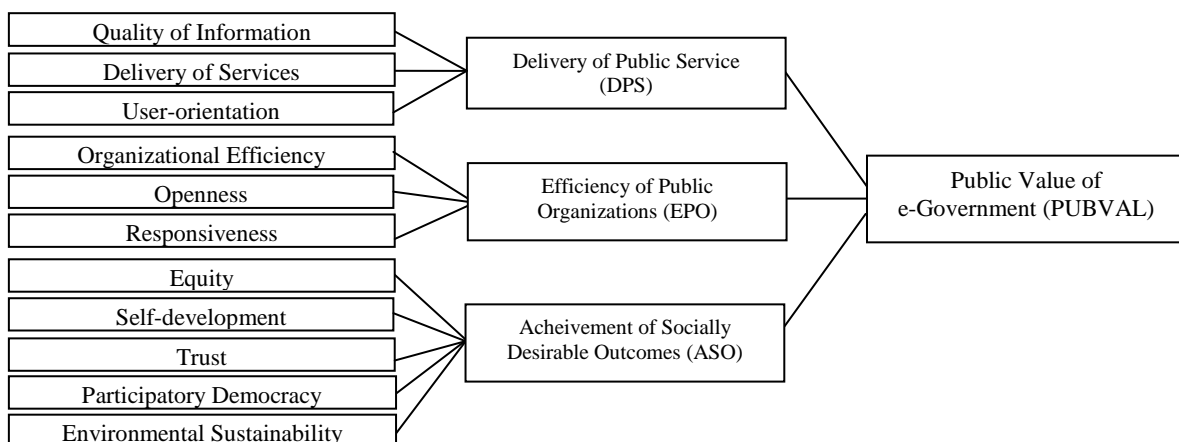


Figure 1. A conceptual framework for evaluating public value of e-government

The quality of information is measured through citizens' perceptions about the value of information available, reflected by the accuracy, timeliness, relevance, precision, and the level of details of the information. The accuracy refers to the error freeness of the information (Wangpipatwong et al. 2005). The timeliness refers to the currency of the information (Klischewski & Scholl 2006). The relevancy compares the relevance of the information with the user's needs (Papadomichelaki & Mentzas 2009). The precision describe the readability and understandably of the information (Papadomichelaki & Mentzas 2009). The appropriate level of details means whether the website provides the relevant information in a sufficiently detailed manner to meet the needs of the information seeker.

The delivery of e-government services can be measured by citizens' perceptions about the value of the two-way transaction between government and users, the ability to pay online for government services and to fill and submit online forms (Torres et al. 2005) and search for information.

The user-orientation concerns about the provision of public services on the user friendly manner for satisfying the user's needs (Jorgensen & Bozeman 2007). It focuses on the citizen-centricity of e-government services delivery. An effective delivery of e-government services requires the adoption of a citizen-centric approach (Chang et al. 2009). As a result, citizens' perceptions about the user-friendliness of government websites, common look and feel of government websites, frequently asked questions (Yoo & Donthu 2001), simple and concise websites addresses (Papadomichelaki & Mentzas 2009), a single website with links to other websites, and of a single website for providing all the information are important for measuring the citizen-centricity of e-government service delivery.

Running efficient public organizations creates public value by establishing and operating institutions that meet citizens' desires (Moore 1995). Citizens expect efficiency, openness, and responsiveness from public organizations (Moore 1995; Kernaghan 2003). Hence, it is hypothesized that public value created by the running of efficient public organization is reflected by the value of (a) organizational efficiency, (b) openness, and (c) responsiveness. E-government is used for improving the efficiency of public organizations by cutting processing costs, making strategic connections between and among government agencies, and creating empowerment (Heeks 2008). This can be achieved by developing better ICT infrastructure, re-designing public functions, sharing public information, and empowering public staff (eGEP 2006). Since public organizations run on tax payers' money, citizens value the improved efficiency of public organizations through e-government (Gauld et al. 2010).

Openness refers to the transparency of public organizations involving in publishing what it has to publish and answering questions from the public (Jorgensen & Bozeman 2007). It can be assessed by publishing public policy drafts online by government for public consultation, disclosure of the public organization budget and expenses online for showing their accountability, publishing tenders online by public organizations for increasing transparency, ability of citizens to make complaints online, and presence of organizational charts and contact information of public officials online.

Responsiveness means that the public administration complies more actively with the demands of the public, and responds to public opinion (Jorgensen & Bozeman 2007). In e-government, the responsiveness is examined through the citizens' perceptions about the public organizations response to their inquiries through e-government access channels, the ability to trace the status of applications submitted, and through the extent to which citizens' charters are displayed online (Karunasena & Deng 2010). In Sri Lanka, citizens' charter is a document issued by the government which specify the minimum number of days that public organizations take to process an application or deliver a service).

The achievement of socially desirable outcomes through e-government creates public value (Kearns 2004). This is usually reflected by the impact, deliverables, and consequences of public services (Cole & Parston 2006) including equity, self-development of citizens, trust, participatory democracy, and environmental sustainability (Kearns 2004; Jorgensen & Bozeman 2007). It is therefore hypothesized that public value created by achieving socially desirable outcomes through e-government is reflected by the value of (a) equity, (b) self-development of citizens, (c) trust, (d) participatory democracy, and (e) environmental sustainability. Equity means the availability of resources for all, and protection and promotion of diversities of culture, especially within minority communities (Benington 2009). To

assess whether equity is created through e-government, citizens' perceptions on government websites' compliance with disability standards (Kuzma 2010), on the availability of e-government initiatives in native languages, on the provision of appropriate content for ethnic minorities and on the availability of e-government resources in rural areas are considered.

The self-development of citizens is another important public value through e-government. Government can leverage resources to validate civic knowledge and skills, enable citizens to be developed through training and employment, and improve learning and capabilities of individuals and communities (Benington 2009). The self-development of citizens through e-government is measured by considering whether citizens can learn and develop their skills through e-government initiatives such as e-learning, improvement of ICT skills, development of network skills and so forth (UNDESA 2003). As a result, the availability of ICT resources for facilitating the improvement of citizens' skills, of e-content for children's education, and of resources for distance learning is important in this regard.

Trust is highly valued by the citizens (Kelly et al. 2002). It is at the heart of the relationship between citizens and government (Kelly et al. 2002). Citizens expect their information to be protected by public authorities (Jorgensen & Bozeman 2007). Online space, however, brings many threats to the privacy and security of citizens' information (Kearns 2004). It has the potential to challenge citizens' trust on e-government, for example, through identity theft or misuse of personal data (Kearns 2004). Citizens will not embrace e-government if their information cannot be securely kept (UNDESA 2003). Trust can be examined through citizens' perceptions on whether government organizations carry out online transactions faithfully (Carter 2008), on provision of privacy statement on the home page, on government organizations efforts for ensuring citizens privacy and information security in their systems (UNDESA 2003), on the legal structure that protects citizens and on the credible information dissemination through e-government channels.

Participatory democracy is used to describe the willingness of public organizations in listening to the public opinion and giving citizens opportunities for participating in the public life (Jorgensen & Bozeman 2007; Benington 2009). E-government can promote participation and democracy (Rowley 2010). In e-government, e-participation refers to citizens' participation in decision making through providing feedback on government policies using e-participation applications such as virtual meetings, feedback pools, and public survey tools (Anttirioko 2003). Government keeps citizens informed about up-coming policies, and citizens participate in online discussions. The ability to post a topic or to set the agenda for public discussions online is important for e-participation (Macintosh 2004).

The environmental sustainability is about leaving a clean environment and plentiful resources to our future generations, instead of wilfully destroying what was created millions of years ago (Jorgensen & Bozeman 2007). E-government applications can bring many environmental benefits by saving energy, limiting the duplication of effort and resources, sharing data and resources, reducing the paper use, and recycling consumable equipments (Molla et al. 2009).

## 4 RESEARCH METHODOLOGY

This study aims to develop and validate a framework for evaluating the public value of e-government. To fulfil the aim of this research, a research question is formulated as follows: *what are the important factors for evaluating the public value of e-government in Sri Lanka?* To adequately answer the research question, a research instrument based on the proposed conceptual framework is developed and operationalized. As summarised in Table 1, the measurement instrument consists of a 64-item scale for validating the conceptual framework. Each item uses a seven point likert-type scale where the value "1" represents 'not valuable at all' and the value "7" represents 'highly valuable'. Prior to the distribution of the instrument, a pilot study is conducted for testing the appropriateness of the items.

<p><i>Q8- Public value of quality information</i>                  QUA_8a - Accurate information                  QUA_8b - Up-to-date information                  QUA_8c - Relevant information                  QUA_8d - Information with right level of details                  QUA_8e - Simple and understandable information</p>	<p><i>Q12- Public value of equity</i>                  EQU_14a - Website content in local languages                  EQU_14b - Kiosks in rural and semi-urban areas                  EQU_14c - Websites comply with accessibility standards                  EQU_14d - Content and services for socially disadvantaged communities                  EQU_14e - Content for ethnic minorities                  EQU_14f - Equally provision of cultural and religious information</p>
<p><i>Q9- Public value of service delivery initiatives</i>                  SER_9a - Pay online                  SER_9b - Compete two way transactions online                  SER_9c - Fill and submit online application forms                  SER_9d - Search information in databases                  SER_9e - Download application forms                  SER_9f - Download archives</p>	<p><i>Q15- Public value of self-development</i>                  SEL_15a - ICT resources for public access                  SEL_15b - Low cost training for citizens                  SEL_15c - Content for students' education                  SEL_15d - Software for developing social and network skills                  SEL_15e - Resources for distance learning</p>
<p><i>Q10- Public value of citizen-focused service delivery</i>                  USO_10a - Well organized, user friendly websites                  USO_10b - Simple website addresses                  USO_10c - A single website with links to others                  USO_10d - A single website for all services                  USO_10e - Look and feel of government websites                  USO_10f - Design websites for nowise users                  USO_10g - Frequently asked questions (FAQs)</p>	<p><i>Q16-Public value of trust</i>                  TRU_16a - Disclaimer and privacy statement on websites                  TRU_16c - Citizens' trust government ensures financial information in online transactions                  TRU_16d - Citizens trust government protects public information in e-government systems                  TRU_16e - Credible information dissemination                  TRU_16f - Protection by laws</p>
<p><i>Q11- Public value of improving the efficiency</i>                  EFF_11a - IT enabled public service counters                  EFF_11b - Re-designed public organizations                  EFF_11c - Improved ICT infrastructure                  EFF_11d - Sharing information among organizations                  EFF_11e - Empowered public sector staff                  EFF_11f - Excess staff removal</p>	<p><i>Q17-Public value of participatory democracy</i>                  DEM_17a - Inform citizens about upcoming polices                  DEM_17b - Participate in online discussions                  DEM_17c - Government takes actual opinion in decision making                  DEM_17d - Ability to post a topic for public discussions</p>
<p><i>Q12-Public value of improving the openness</i>                  OPE_12a - Public policy drafts online                  OPE_12b - Disclosure of the budget online                  OPE_12c - Annual plans and progress online                  OPE_12d - Publish tenders online                  OPE_12e - Citizens make complaints online                  OPE_12f - Display contact information online                  OPE_12g - Staff contact information online                  OPE_12h - Display organizational charts and duties</p>	<p><i>Q18- Public value of environmental sustainability</i>                  ENV_18a - Switch off electrical equipment                  ENV_18b - Limit duplication effort and resources                  ENV_18c - Reduction of paper printing                  ENV_18d - Recycling consumable equipments                  ENV_18e - Implementing 'Green IT' policies                  ENV_18f - Retire energy inefficient systems</p>
<p><i>Q13- Public value of improving the responsiveness</i>                  RES_13a - Display citizen charter online                  RES_13b - Ability to make inquires online                  RES_13c - Follow-up emails for inquires                  RES_13d - Online case tracking                  RES_13e - Automatic responses to submissions</p>	

Table 1. A description of the items for validating the framework

The survey was conducted in Sri Lanka in between November 2009 and May 2010. The target population is citizens who have used e-government services across both urban and rural areas. 1200 survey questionnaires were distributed. A total of 572 responses were received. Among them 214 respondents had not used e-government and 65 responses were incomplete. Hence they were removed from the analysis. The response rate of the survey is therefore 29.71%. In this research, the reasons for non-response could be respondents' lack of interest in the research topic, their level of education, or some other social and economical factors. The remaining 276 responses are retained. Data are stored and screened using PASW Statistics for addressing the missing values, outliers, kurtosis, and skews.

The collected data are analyzed using SEM for identifying the critical attributes in evaluating the public value of e-government. Such a technique is required for testing the relationships between

measured variables and unobserved constructs, and for estimating the relationships between unobserved constructs. To assess and test the initial constructs, confirmatory factor analysis (CFA) and analysis of moment structures (AMOS) are used. To assess the model’s overall fit, various goodness-of-fit (GOF) measures are used including chi-square ( $\chi^2$ ) and the ratio of  $\chi^2$  to degree of freedom ( $\chi^2/df$ ). The root mean square error of approximation (RMSEA), the standardized root mean residual (SRMR) as absolute fit measures, comparative fit index (CFI), Tucker-Lewis index (TLI) and incremental fit index (IFI), and goodness of fit index (GFI) as a parsimony fit index are deployed. The maximum likelihood estimation technique is used for estimating the parameters in the model.

## 5 DATA ANALYSIS

Figure 2 shows three initial measurement models developed for the delivery of public service (DPS model) the efficiency of public organizations (EPO model), and achievements of socially desirable outcomes (ASO model). These models use reflective constructs and reflective indicator variables which lead to reflective SEM. For example, the higher order construct, public value of delivery of public service (DPS), is reflected, rather than influenced, by the citizens’ perceptions about the value of quality information (QUALI), delivery of services (SERVI) and user orientation (USERO).

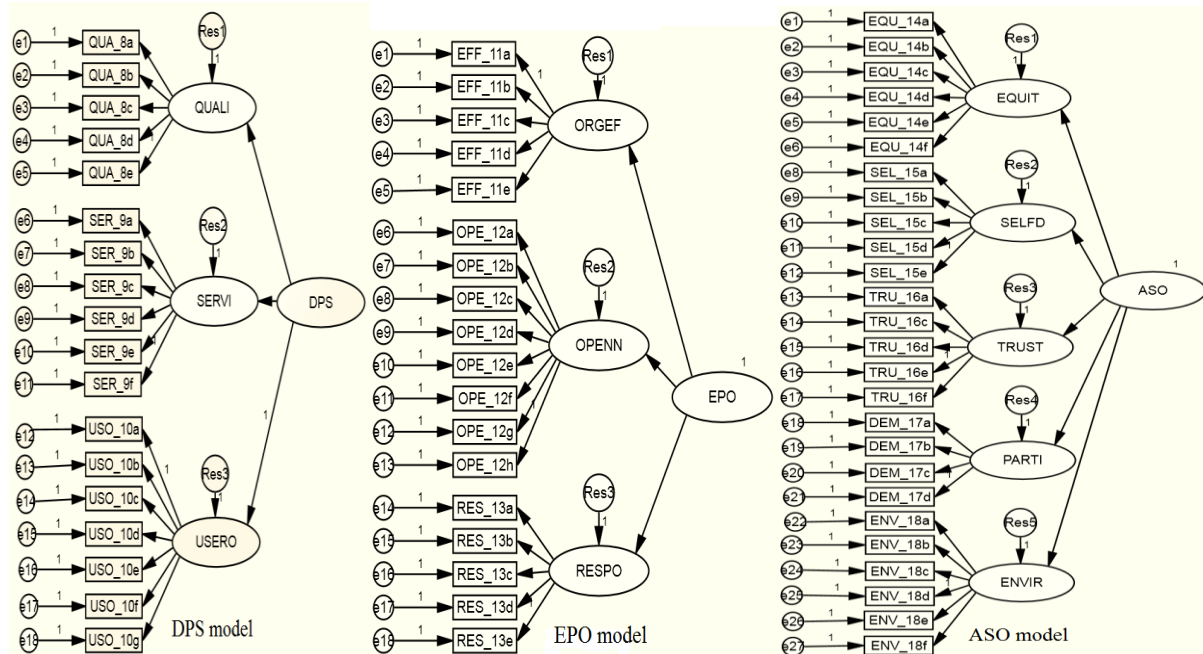


Figure 2. The measurement models

The DPS model consists of delivery of public services (DPS), quality of information (QUALI), delivery of services (SERVI), and user-orientation (USERO). Five indicator variables (QUA\_8a to QUA\_8e) are postulated to load on the first order construct QUALI. Another six indicator variables (SER\_9a to SER\_9f) are loaded on construct SERVI, and the remaining seven indicator variables (USO\_10a to USO\_10g) are loaded on USERO. Similarly, as shown in Figure 2, EPO model is developed by considering organizational efficiency (ORGEF), openness (OPENN), and responsiveness (RESPO). ASO model consists of equity (EQUIT), self-development (SELFD), trust (TRUST), participation democracy (PARTI), and environmental sustainability (ENVIR).

The results of the initial estimations of the each model (DPS, EPO, and ASO) do not provide sufficient GOF results. This led to re-examination of one factor congeneric models. These models were re-specified with the use of several diagnostic measures including standardized factor loading (SFL), standardized residuals, and modification indexes (Hair et al. 2010). In this research, SFL less than 0.5



and standardized residuals greater than  $|\pm 2.5 \approx \pm 2.58|$  were used as cut off points in model re-specification (Hair et al. 2010; Byrne 2010). Standardized residuals greater than  $|\pm 4.0|$  suggest potentially unacceptable degree of error that leads to the deletion of offending items (Hair et al. 2010). One factor models re-specification process led to the deletion of several items. Moreover, model re-specification suggests two sub factors for construct SERVI (SERVI1 and SERVI2).

To evaluate the measurement properties of the models and their constructs, (a) convergent validity, (b) discriminant validity, (c) and factorial validity are examined. Convergent validity examines the extent to which “indicators of a specific construct converge or share a high proportion of variance in common” (Hair et al. 2010, p 670). Convergent validity can be assessed by (i) the significance of the factor loadings of all items, (ii) average variance extracted (AVE), and (iii) reliability of constructs (Hair et al. 2010). The significance of factor loading of items can be assessed through SFL. As a good rule of thumb, SFL for each observed item should be at least 0.5 or higher, and 0.7 is ideal (Hair et al. 2010). An AVE of 0.5 or higher is adequate convergent validity (Hair et al. 2010). Construct reliability can be measured with coefficient  $H$  with 0.70 or higher being acceptable (Hancock & Mueller 2001).

Table 2 shows the results of the discriminant validity of the re-specified constructs in the final measurement model. All the constructs met the acceptable  $\chi^2$  fit measures, where the probability ( $P$ )  $> 0.05$ , normed  $\chi^2$  ( $\chi^2/df$ )  $< 2.0$ , and RMSEA  $< 0.05$  (Byrne 2010). Although RMSEA values for the constructs SERVI 1, EQUIT, and TRUST are little higher than 0.5, they are not significantly different from the threshold (0.05). Moreover, all the constructs exceed the appropriate CFI value  $> 0.90$  which indicates sufficient validity (Byrne 2010; Hair et al. 2010). Most of the constructs have achieved the highest CFI value 1.0. Construct reliability statistics reveal that reliability of all the constructs have met the appropriate cut-off point  $H$  value at 0.70 or are not significantly different from cut-off value. Similarly AVEs for all the constructs have met the appropriate threshold (0.5), except for OPENN. Furthermore, all the items in the measurement models are significant where SFL are greater than 0.5. It is, therefore, concluded that all the constructs presented in Table 2 have sufficient convergent validity. However, constructs RESPO and PARTI are dropped from the final model as a result of insufficient fit statistics ( $P < 0.05$ ,  $\chi^2/df > 2$ , and very large RMSEA) and due to insufficient convergent validity. Constructs that pass convergent validity is taken for discriminant validity test.

Discriminant validity refers “to which a construct is truly distinct from other constructs both in terms of how much it correlates with other constructs and how distinctly measured variables represent only this single construct” (Hair et al. 2010, p 669). It is examined by performing  $\chi^2$  difference tests through constraining the estimated correlation parameter between each pair of constructs to 1.0, and by obtaining  $\chi^2$  difference values for the constrained and unconstrained models (Anderson & Gerbing 1988). A significantly lower  $\chi^2$  value for the model in which the correlations are not constrained would indicate that constructs are not perfectly correlated, and therefore, discriminant validity is achieved (Anderson & Gerbing 1988). Table 3 shows the  $\chi^2$  difference ( $\Delta \chi^2$ ) between constrained and unconstrained models of each pair of first order constructs. For example,  $\chi^2$  for unconstrained model for the pair of QUALI and SELFD is 23.113 and  $\chi^2$  for the constrained model is 130.276. This suggests that the unconstrained model’s  $\chi^2$  is significantly different ( $\Delta \chi^2$  is 107.163) from the constrained model and therefore, discriminant validity among QUALI and SELFD is achieved at  $p < 0.05$ . All  $\chi^2$  differences are significant at  $P < 0.05$ , and therefore, all the first order constructs have sufficient discriminant validity. Similarly  $\chi^2$  difference tests indicate sufficient discriminant validity among the higher order constructs namely DPS, OEP, and ASO ( $\Delta \chi^2$  of DPS and OEP: 118.62, DPS and ASO: 118.43, OEP and ASO: 70.14).

The factorial validity test is conducted for assessing whether the factors that pass convergent validity and discriminant validity tests represent the same higher level construct (PUBVA), and to detect and drop any cross-loading items. The GOF measures indicate that the final measurement model has sufficient validity.  $\chi^2$  test data show that the model moderately fits to the data ( $\chi^2/df$  is  $1.501 < 2.0$ , and  $P$  value is 0.001). However, other absolute fit measures such as RMSEA and SRMR indicate that the model has reached good fit to the data where RMSEA (0.043) is less than the 0.05 with a PCLOSE value of 0.971 which is very close to 1.0 (PCLOSE  $> 0.05$  is appropriate). The SRMR value is 0.044

which is less than 0.08 indicating that the final model is an adequate fit. Furthermore, CFI (0.943), IFI (0.944), and TLI (0.939) are very close to the 0.95 indicative of a very good fit (Byrne 2010; Hair et al. 2010). Moreover, GFI value (0.87) showing that the model is approaching an adequate fit.

Construct	RMSEA	CFI	P	AVE	H	Indicator variable and description	SFL
Quality of Information (QUALI)	0.000	1.0	0.53	0.53	0.85	QUA_8a Accurate information	0.525
						QUA_8b Up-to-date information	0.700
						QUA_8c Relevant information	0.827
						QUA_8d Information with details	0.815
Services (SERVI1)	0.600	0.98	0.12	0.50	0.64	SER_9b Complete two way transactions	0.685
						SER_9c One way transactions	0.685
Services (SERVI2)	0.000	1.0	0.54	0.60	0.82	SER_9d Search interactive information	0.744
						SER_9e Download forms	0.812
						SER_9f Download archives	0.760
User-orientation (USERO)	0.000	1.0	0.57	0.55	0.80	USO_10b Simple website addresses	0.725
						USO_10c Web index	0.815
						USO_10d Information from single window	0.668
Efficiency (ORGEF)	0.000	1.0	0.60	0.48	0.79	EFF_11b Re-designed processors	0.658
						EFF_11c Improved ICT infrastructure	0.719
						EFF_11d Sharing info among organizations	0.645
						EFF_11e Empower public staff with ICT	0.766
Openness (OPENN)	0.000	1.0	0.71	0.43	0.70	OPE_12a Policy drafts for consultation	0.617
						OPE_12d Publish tenders online	0.615
						OPE_12f Display contact info online	0.723
Equity (EQUIT)	0.057	0.99	0.17	0.67	0.86	EQU_14a Local languages	0.789
						EQU_14d Content for needy people	0.865
						EQU_14e Content for ethnic minorities	0.773
Self-development (SELFD)	0.000	1.0	0.38	0.57	0.87	SEL_15a ICT resources for public access	0.736
						SEL_15b Low cost training for citizens	0.725
						SEL_15c Content for students' education	0.883
						SEL_15d Applications that develop skills	0.699
Trust (TRUST)	0.058	0.99	0.16	0.58	0.83	TRU_16d Protect info in e-gov. systems	0.845
						TRU_16e Credible information	0.781
						TRU_16f Protection by law	0.653
Sustainability (ENVIR)	0.000	1.0	0.75	0.57	0.84	ENV_18b Power off computers not using	0.744
						ENV_18c Reduction of paper printing	0.720
						ENV_18d Recycle reusable equipments	0.774
						ENV_18f Retire energy inefficient systems	0.779

Table 2. The results of convergent test of final model

Constructs	Chi-square difference ( $\Delta x^2$ ) where all the $\Delta x^2$ values are significant at the $p < 0.05$									
	1	2	3	4	5	6	7	8	9	10
1 QUALI										
2 SERVI1	48.29									
3 SERVI2	79.48	12.74								
4 USERO	88.61	30.92	45.40							
5 ORGEF	105.18	46.98	70.31	78.81						
6 OPENN	94.91	41.83	62.56	56.16	77.24	-				
7 EQUIT	86.34	43.04	62.23	69.74	72.23	64.09	-			
8 SELFD	107.16	43.19	60.61	86.96	76.17	80.01	61.55	-		
9 TRUST	101.07	58.00	71.76	79.18	84.37	73.57	88.51	78.72	-	
10 ENVIR	91.93	43.80	65.22	70.65	65.98	65.15	55.57	72.54	57.66	-

Table 3. The results of discriminant validity tests of first order constructs

## 6 FINDINGS AND CONCLUSION

Figure 3 shows a strong support for all paths in the structural model with regression values ranging from 0.79 to 0.97 at  $P < 0.001$ . The model accounts for 77% variances in the delivery of public service (DPS), 97% in operating efficient public organizations (EPO), and 81% in the achievement of socially desirable outcomes (ASO). The evaluation framework of e-government accounts for 34% of the variance in quality of information (QUALI), 73% in service delivery (SERVI), 69% in user-orientation (USERO), 79% in organizational efficiency (ORGEF), 86% in openness (OPENN), 73% in equity (EQUIT), 81% in self-development (SELFD), 70% in trust (TRUST), and 63% in environmental sustainability (ENVIR).

Accurate and relevant information with an appropriate level of detail disseminated in a timely manner is critical for creating public value of e-government. The analysis reveals that the quality of information is the least contributing factor, explaining only 34% of the variance. E-government services are an important public value in Sri Lanka which explains 73% variance of the model. Citizens value both transactional services (SERVI1) and simple e-services (SERVI2). The findings reveal citizens' lack of interest in online payment activities. On the user-orientation of e-government, the analysis suggests that the citizen-centric features such as simple and easy-to-remember website addresses and web portals where information is disseminated through a single window are valued.

The organizational efficiency is crucial for the public value evaluation of e-government. The analysis shows that citizens value improving ICT infrastructure for better performance in public organizations, re-designing government processes in a citizen centric manner and empowering public staff with appropriate ICT skills. All these activities have the potential to improve the organizational efficiency, leading to the cost reduction in public organizations and the saving of tax payers' money. Although implementing e-government is a way of saving money for government, the analysis reveals that citizens do not value money saving by cutting staff from e-government implementation. Improving the openness of public organizations through e-government is another important factor for evaluating the public value. The study shows that displaying government officials' contact information online and publishing tender particulars online are valuable for improving the openness of public organizations.

Citizens value the dissemination of information through local languages. This study shows that citizens value government efforts to build citizens' skills through e-government initiatives. For example, citizens' value e-content that supports children's education, low cost ICT training, applications that help to develop social and network skills, and availability of resources to develop the ICT skills of citizens. Trust is another critical factor for evaluating the public value of e-government. Citizens expect that e-government will ensure the secrecy of their sensitive information held in computer systems, dissemination of credible information, and protection of citizens by law. The perceptions of citizens' about e-government's contributions to environmental sustainability are positive. Reduction of paper usage by introducing electronic copies, recycling ICT equipments and papers, switching off computer systems when not using, and retiring energy inefficient computer systems are seen as valuable for contributing to environmental sustainability.

This research aims to develop a framework for evaluating the public value of e-government by addressing the shortcomings of existing frameworks. By performing CFA based on the survey data collected in Sri Lanka, the framework is tested and validated. The findings reveal that the quality of information, e-services, user-orientation, organizational efficiency and openness, equity, trust, self-development, and environmental sustainability are the important public values. The originally hypothesized framework is revised as shown in Figure 3. In the data analysis, participatory democracy was dropped due to having insufficient convergent validity. This may be due to the lack of readiness in for providing citizens with appropriate facilities to participate in democratic decision making.

The study findings show that the developed framework can be effectively used for evaluating the public value of e-government. It provides government of Sri Lanka with an effective means for better

understanding the impact of their of their e-government efforts on their citizens and societies, leading to better policies and strategies being made for the continuous development of e-government.

A limitation of this study is the context specific nature of the public value in the evaluation process. The meanings and interpretations of public values vary significantly from state to state, or even from society to society (Jorgensen & Bozeman 2007). Therefore, the interpretations of public values adopted in this research would be different from the interpretations adopted in other countries.

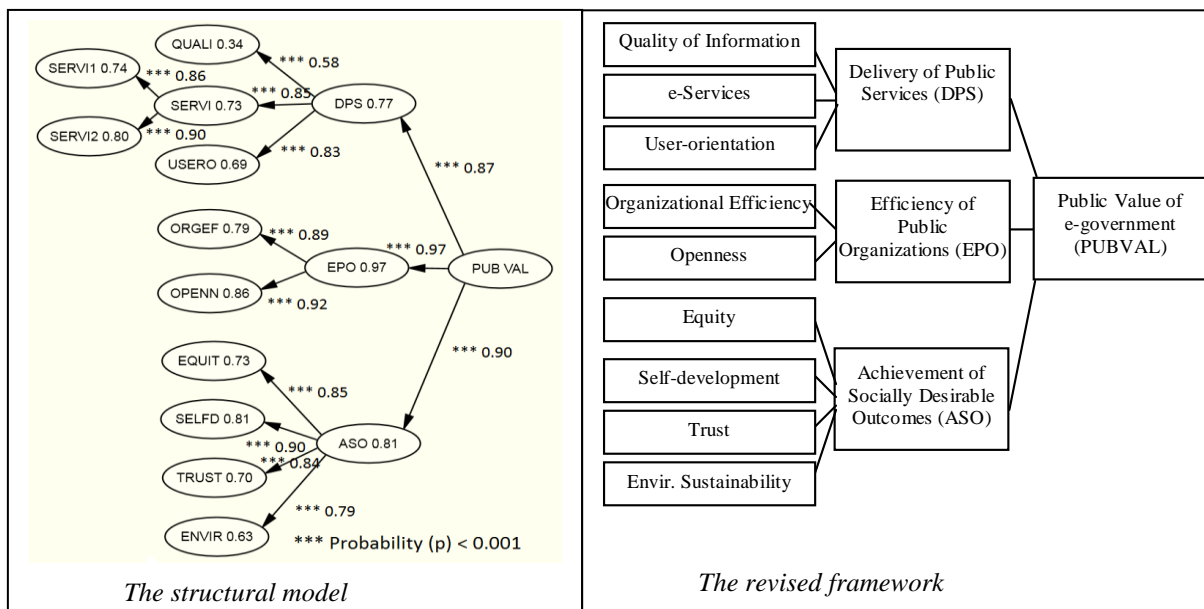


Figure 3. The final models

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