

Information Sharing Model in Supporting Implementation of e-Procurement Service: Case of Bandung City

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Abstract— This research examines the factors influencing the Information Sharing Model in Supporting Implementation of e-Procurement Services: Case of Bandung City in its early maturity stage. The early maturity of information sharing stage was determined using e-Government Maturity Stage Conceptual Framework from Estevez. Bandung City e-Procurement Information Sharing system was categorized at stage 1 in Estevez' model where the concern was mainly on assessing the benefit and risk of implementing the system. The Authors were using DeLone & McLean (D&M) Information System Success model to study benefit and risk of implementing the system in Bandung city. The model was then empirically tested by employing survey data that was collected from the available 40 listed supplier firms. D&M's model adjusted by Klischewski's description was introducing Information Quality, System Quality, and Service Quality as independent variable; Usability and User Satisfaction as intermediate dependent variable; and Perceived Net Benefit as final dependent variable. The findings suggested that, all of the predictors in D&M's model significantly influenced the net perceived benefit of implementing the e-Procurement system in the early maturity stage. The theoretical contribution of this research suggested that D&M's model might find useful in modeling complex information technology successfulness such as the one used in e-Procurement service. This research could also have implications for policy makers (LPSE) and system providers (LKPP) following the introduction of the service. However, the small number of respondent might be considered limitation of the study. The model needs to be further tested using larger number of respondents by involving the population of the firms in extended boundary/municipality area around Bandung.

Keywords— e-Procurement, Information Sharing Model, DeLone & McLean (D&M) Information System Success Model, LPSE, Bandung Indonesia.

1. Introduction

The concept of e-Government (e-Gov) has been in place for several years in Indonesia. However the endeavor toward massif deployment has never been so clear as today, empowered by national Administration. People was starting switching to the digital services as usually termed as G2C (Government to Citizen) Services. It was then mandatory for the Government (both local and national) to provide clear roadmap for development. In term of Information sharing, there has been no clear central policy as well. E-procurement programs has become a main e-Gov focus in Bandung's digital initiative of Smart City.

This research examines the factors influencing the Information Sharing Model in Supporting Implementation of e-Procurement Services: Case of Bandung City in its early maturity stage. The Authors were using DeLone & McLean (D&M) Information System Success model to study benefit and risk of implementing the system in Bandung city.

This paper also adds to the discussion of the use of the IS success model (D&M) originally developed by DeLone and McLean in 1992. D&M model was refined later in further work in 1992 and has been updated in 2003 which discussed the updated model [1]. Several previous discussion on the use of the model covered: the use as tool to evaluate Telemedicine Systems Success [2], the use as tool to evaluate virtual learning [3], the use as tool to evaluate e-commerce success [1], and discussion on original and updated model [4]. However, earlier research on the D&M model did not cover the context of e-procurement. It would be helpful to initiate adding the discussion on the context for the

benefit of both Bandung policy makers as well as academic.

In an e-procurement context, the study focused to describe the success of the e-procurement information sharing from the supplier perspective in its early maturity of e-Gov. Using Estevez E-Government Maturity Stage Conceptual Framework, Bandung City e-Procurement system was categorized at stage 1, where the concern was mainly on assessing the benefit and risk of implementing the system in the city environment. The model was empirically tested by employing survey data that was collected from the available 44 listed supplier firms.

DeLone's model adjusted by Klischewski's description introduced Information Quality, System Quality, and Service Quality as independent variables; Usability/Use and User Satisfaction as intermediate dependent variables; and Perceived net Benefit as ultimate dependent variable. The findings suggested that, all of the predictors in DeLone's model significantly influenced the perceived net benefit of implementing the e-Procurement system in the early maturity stage.

This research was attempting to find answers to the following question: What factors are influencing Information Sharing Model in Supporting Implementation of e-Procurement Service in Bandung, Indonesia?

The theoretical contribution of this research suggested that DeLone's model might find useful in modeling complex information technology successfulness such as the one used in E-Procurement service. This research could also have implications for policy makers (LPSE) and technology providers (LKPP) since the introduction of the service. The small number of respondent might be considered limitation of the study.

2. Government Information Sharing Framework (GISF)

According to Estevez,

“Information sharing (IS) is a key capability required for one-stop and networked government, responding to a variety of intra-organizational, inter-organizational, or cross-national needs like sharing service-related information between parties involved in the delivery of seamless services, sharing information on available

resources to enable whole-of-government response to emergencies, etc. Despite its importance, the IS capability is not common for governments due to various technical, organizational, cultural, and other barriers which are generally difficult to address by individual agencies.”

Estevez further stated that:

“However, developing such capabilities is a challenging task which requires government-wide coordination, explicit policies and strategies, and concrete implementation frameworks. At the same time, reconciling existing theoretical frameworks with the IS practice can be difficult due to the differences in conceptions and abstraction levels.” [5]

Estevez et.al further developed a conceptual framework down to abstraction level of Government Information Sharing which consisted of three level of maturity: (1) Level 1 - Experience Sharing, the concepts that should be considered in early stages of government IS, serving to lay the foundations for government IS; (2) Level 2 - Infrastructure Support, concepts referring to the shared components accessible to the whole public administration, like infrastructure components, IS facilitation and promotion, etc., and (3) Level 3 - Information Strategy, concepts defining the information sharing environment. The abstract view of the framework is shown in Table 1. The shaded area is the concern of this study.

Table 1. Abstract View of Government Information Sharing Maturity Model [6]

Concepts		Maturity Stages		
		1-Experience Sharing	2-Infrastructure Support	3-Information Strategy
DIMENSION	Environmental	benefit - risks	laws - regulations	strategy - engagement
	Inter-organizational	scope	partnership - trust	Governance - community
	Organizational	roles	processes - people	capacity building function
	Technological	unit data component	standards - attributes	Repositories ontologies

Implementation of e-procurement in Bandung City Government itself is run by the Electronic Procurement Services for Goods and Services (LPSE) as a working unit Regional Development Planning Board (Bappeda) in Bandung. LPSE is a unit formed in various agencies and local

governments to serve the Procurement Services Unit (ULP) or Procurement Committee (or Procurement Working Group) which will implement electronic procurement. The whole ULP and Committee can use LPSE facility closest to his seat. LPSE Bandung is currently undergoing organization restructuring by the Mayor of Bandung. LPSE operation complies with the procurement policy and regulation stipulated by Procurement Agency of goods / services (LKPP). LKPP is an institution whose tasks is to develop and formulate Procurement policy and regulation on the Presidential level. Bandung has been employing e-procurement since 2007 as an introduction phase. However only since 2013 Bandung LPSE was formalized when it was obliged to use centralized procurement system developed by LKPP [7]. Therefore categorized as in early stage of e-Gov service.

In environmental model as proposed by Estevez in Stage 1, information sharing in e-procurement was of two types. One which concerned the broadcast of information from LPSE which was public in nature. These kind of information could take the form of public announcement, regulation, standard procurement process, etc. The other type of sharing was the information which were shared by the suppliers in more confidential manner. The information from the supplier about the supplier were mostly for the use of LPSE only, which were allowed to be shared with other governmental organization only, and cannot made public, unless it were intended for public announcement.

The intention of this study was to identify factors that influence the benefit of information sharing – Estevez stage 1, from suppliers perspective, shown as the shaded area in Table 1. To identify factors that influence the benefit of information sharing in stage 1, from supplier's perspective, we seek to borrow from updated DeLone & McLean Information System Success Model.

3. The Methodology Used in The Research

3.1 DeLone & McLean Information System Successfulness Model

DeLone & McLean Information System Successfulness Model construct is shown in Figure 1.

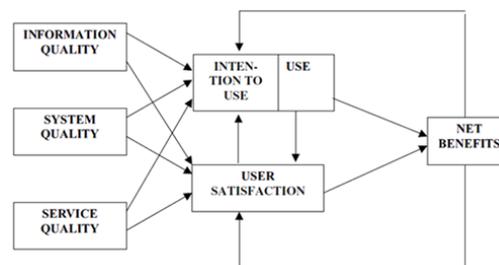


Figure 1. Updated DeLone & McLean IS Success Model [1]

In this model of study, as circumstances applies, the authors seek to understand characteristics in the early stage of GISF adoption, where only environmental dimension was taken into factor (benefit). The other three dimension in Stage 1 - GISF: Inter-Organizational, Organizational, and Technological were not taken into consideration. This study also assumed that Intention to Use and Use constructs merged into single construct Use. The description of the construct also lent from the paper written by Raija Halonen et.al. [3].

3.2 The Framework of Research Thought

This research analyzed the factors that affecting information sharing in supporting the implementation of e-Procurement Service in Bandung City. The services was operated by an organization named LPSE while the e-Procurement System was made available by central organization LKPP. The analysis was based on DeLone & McLean theory. The said theory employed seven constructs, those were : Information Quality (IQ), System Quality (SQ), Service Quality (SeQ), Usability/Use (U), User Satisfaction (US), and Net Perceived Benefit (B). The model construct is depicted in Figure 1.

3.3 The Location of the Research and Sample Size

The location of the research was Bandung City. The size of supplier population to Bandung City, according to data from LPSE portal is 600. It further reduced to 300 due to data cleansing. In the field only 44 supplier were available for questionnaire.

3.4 Survey Instrument

Overall, the questionnaire used in this research contained six questions to describe respondent characteristics and eighteen questions representing all variables. The six questions were multiple-choice and investigated the respondents' demographic characteristics such as, age, gender, years in position, occupation and internet literacy. Eighteen, variables relevant close-ended, questions were included in the questionnaire. The operationalization of variables were as follows: (1) Information Quality (4 questions); (2) System Quality (3 questions); (3) Service Quality (4 questions); (4) Usability/Use (4 questions); (5) User Satisfaction (1 questions); (6) Net Perceived Benefit (3 questions).

In order to obtain a high response rate the survey was conducted using phone call and face to face distribution. During data collection, the authors emulated a friendly encounter environment with regard to the respondents, even though the questionnaires were distributed individually. This was due to instances where respondents preferred to answer close-ended questions within the interactive, non-self-administered questionnaires situation.

3.5 Data Analysis

The questionnaire data was analyzed using SmartPLS. Bacon [8], Hwang et al. [9], and Wong [10] stated that PLS technique could be used in situation where sample size was small, applications had little available theory, predictive accuracy was paramount, and correct model specification could not be ensured.

This allowed to work with relatively small size of population where the nature of service offered was least understood by the respondents. D&M model had been used to study various adoption of information system, hence considered as a correct model, however the use of the model to study e-Gov maturity model was yet to be verified. The authors expect to get better prediction using PLS where population was relatively small and the information system implementation was least understood. The authors suspected that correlation among indicators existed, then consider this a reflective measurement.

3.6 The Hypotheses

The research objective was to verify the following alternative hypotheses (HA) as follows:

HA(1): Information Quality (IQ) is positively significantly influences Usability (U)

HA(2): System Quality (ISQ) is positively significantly influences Usability (U)

HA(3): Service Quality (IQ) is positively significantly influences Usability (U)

HA(4): Information Quality (IQ) is positively significantly influences User Satisfaction (US)

HA(5): System Quality (ISQ) is positively significantly influences User Satisfaction (US)

HA(6): Service Quality (IQ) is positively significantly influences User Satisfaction (US)

HA(7): Usability/Use (U) is positively significantly influences User Satisfaction (US)

HA(8): Usability/Use (U) is positively significantly influences Perceived Net Benefit (B)

HA(9): User Satisfaction (US) is positively significantly influences Perceived Net Benefit (B)

4. The Result of the Research

4.1 The Measurement Model

The outer (measurement) model was analyze using SmartPLS software. The authors assessed validity test parameters, and learned that in the first analysis, not all parameters fit to the rule of thumb. It shows that the AVE and Communality values of 0.48 which is below the rule of thumb 0.5. The low value of AVE is consistent with Cronbach's Alpha validity test, which shows number lower than accepted valid test standard of 0.7.

The cross loading among variables in the first analysis shows that all factor loading are greater than 0.6 except for indicator IQ2 which value is 0.56.

The Root AVEs and the correlation among variables of the first analysis are tabulated in Table 4. The table shows that most of the Root AVEs are greater than correlation coefficient except for variable U.

The composite reliability for each of the variable is fairly high (greater than 0.6), which provide confidence on the measurement. To improve the validity and reliability of test improvement, the Authors removed indicators IQ2 and U2. IQ2 because it showed lower value than rule of thumbs,

and U2 because it showed the weakest correlation to variable U. The second analysis showed that if U2 was not removed, it would not fit rule of thumb of the greatest correlation with the construct (U).

After removal of IQ2 and U2 in the second analysis, the Authors manage to obtain better validity figure represented by AVE value being greater than 0.5. However Cronbach's Alpha was still slightly below 0.7. However, for AVE was satisfying rule of thumb, the Authors concluded validity fit. On the other hand reliability test showed very good value of Composite reliability test, the value of which being in the range of 0.81 to 0.91.

For discriminant test, second analysis also provided better fit to the rule of thumb for Root AVE and Latent Variable Correlation. Root AVE of U was slightly below U and SeQ correlation coefficient but higher than correlation of U with the rest of latent variables. In the second analysis, the Authors concluded that validity and reliability test of outer model as fit. Having better fit for instrument validity and reliability test, the Authors proceeded with inner model test and analysis.

4.2 The Structural Model

From structural modeling the significant factors influencing behavioral intention was finally derived. Significance test is accepted if t-statistic greater than 1.96. It is resulted in: only hypotheses H4 was rejected. The result provide $R^2=0.557$ which was fairly close - in the range of moderate - comparing to expected value of greater than 0.6.

5. Discussion

The result of the research shows that all the constructs: Information Quality, System Quality, Service Quality, Usability/Use, User Satisfaction, Net Perceived Benefit, significantly influence the Information Sharing Model in Supporting Implementation of E-Procurement Services: Case of Bandung City in its early maturity stage.

As shows in figure 2, Information Sharing can be described by factors Information Quality, System Quality, Service Quality, Usability/Use, User Satisfaction, and Net Perceived Benefit significantly. Among the three independent latent variables, Service Quality happens to play the highest influence (path coefficient = 0.560 toward

Usability and 0.450 toward User Satisfaction) in sample's Information Sharing Model in Supporting Implementation of E-Procurement Service: Case of Bandung City.

The second influencing factor is System Quality (path coefficient = 0.196 toward Usability). The negative correlation (path coefficient = -0.311) of this variable toward User Satisfaction was beyond comprehension. The Authors expected to get both in positive correlation for simple reason: the better the information quality they share, the better user experience which would lead to better User Satisfaction from the perspective of the suppliers (the users of LKPP system). The Authors suspected that may be the relation between the two variables were not that simple. There would be other intervening factors. This needed further study.

The least influencing factor is Information Quality (path coefficient=0.167). This confirmed our expectation that early maturity stage was dominated by individuals or companies whose using motive was merely forced by administration policy. They were to learn more on using the system than on the capitalization of the information system performance. However the rejection of H4 hypotheses was counterintuitive. The Authors expected that Information Quality should positively influenced User Satisfaction. This finding needed also further examination of the relation between both latent variables.

Usability/Use and User Satisfaction simultaneously were affecting the Perceived Net Benefit (path coefficient 0.611 and 0.397 respectively). They proved with sufficient confidence that D&M construct worked to model Information Sharing maturity in early stage where the dimension, as stipulated in aforementioned Introduction was: Environment. By Environment we translated as user/supplier. The small $RSquare$ for User Satisfaction (US $RSquare=0.232$) was due to the facts that Information Quality and System Quality failed to contribute to User Satisfaction construct variability.

The model was successful to represent predictors for Information Sharing benefit with rounded $RSquare=0.6$. Another 40% of variability was due to unknown factors. This condition opened the opportunity for model improvement.

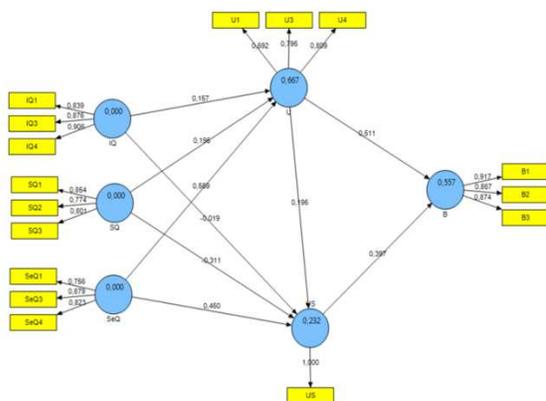


Figure 2. Diagram shows factor loading and path coefficient after second analysis. Line in cross is the hypotheses rejected.

6. Limitations of the Research

This research had a couple limitations which should be addressed in future studies. Firstly, the number of respondents in this research was too small. The small number was due to administrative constraint. This research was aimed only to study Information sharing in Bandung City area. While the companies listed in LPSE were close to 600, the companies those available for questionnaires were only 44 despite the effort to contact them all. The next planned research was to extend the population to the municipality surrounding Bandung City. Therefore getting greater number of respondent would be made possible.

The second limitation was that the findings should only regarded as preliminary report in using D&M to asses information sharing in e-Procurement as it was intended to a case study only. For the purpose of generalization of the result nationwide would be needed further study.

7. Conclusion

The result of the research shows that all the constructs, in order of appearance: Service Quality, System Quality, and Information Quality, significantly influence the perceived benefit of Information Sharing Model in Supporting Implementation of E-Procurement Service trough Usability and User Satisfaction.

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