ANNALS of Faculty Engineering Hunedoara
International Journal of Engineering
ISSN: 1584 - 2665

STUDY OF E-PROCUREMENT IMPLEMENTATION IN GOVERNMENT'S GOODS/SERVICES IN INDONESIA

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ABSTRACT
Many potential benefits resulted from implementing e-procurement system and a number of regulations as judicial base for adopting the system haven't make a fast growing of e-procurement implementation in Indonesia. It seems that there are many obstacles lies and it have been causing many Local Governments in Indonesia have a slow progress in adopting the system, and this situation let the Government still loosing any potential budget efficiencies. The objectives of this research are identifying those implementation barriers and calculating their relative weight and influence levels using the Analytic Network Process method. The result from analysis shows that Regulation (0,093), Infrastructure (0,091), Security (0.089), Complexity (0,082), and Skill barrier (0,081) become the five most influencing factors, according to all respondent's, among sixteen barriers identified. Further discussion reveals that each barrier has their triggering factors. Expected from knowing these barriers and their own triggering factors, local authorities could conduct any anticipative acts that should be done in order to perform an optimal implementation of e-procurement system in their administrative area.
KEYWORDS: E-procurement, Government, implementation barrier, analytic network process

1. INTRODUCTION

Government's good/services procurement for public needs has come into a new phase through internet usage in tender process. The old-conventional system that identical with paper-based administration has been left toward a web-based procurement, well known as e-procurement. E-procurement implementation in Indonesia isn't a new fashion and it has started since 2001 when Civil Works Department began an initial test of semi e-procurement, and since 2004 has been released much tender information through online notifications on their website. In the city levels, e-procurement was started in 2003 by City Government of Surabaya as pioneer which released "*www.lelangserentak.com*" as procurement site. Government of Indonesia has realized the important of improvement in this sector, and it can be seen from the existence of many regulations that can act as a judicial base of e-procurement implementation. At least five Laws (Undang-Undang), three Governments Directives, one President's Decree, three President's Directives, a number of Civil Works Minister's Decrees, until some Civil Works Minister's Regulations have been released. Through e-procurement, Government may gain many potential benefits, such as: efficient budget resulted from a fair tender, more efficient and effective tender process, gain wide control, accountability, and transparency, improves self-competitiveness through head-to-head competition, wider access to the project, and of course expected in the end are more project qualities. On the other side, e-procurement benefits for supplier are: simplify the tender process, cost efficiency, reduce overhead of tender process, time efficiency, wider span and business opportunities, wider supply chain network, etc. In other words, e-procurement is a method that Government may reduce any inefficiencies in serving their people though transparent tender process (Kierkegaard, 2006). Although many regulations exist and many potential benefits can be gained from the system, the number of Local Government who adopts e-procurement system still below expectations. In year 2006, it was just 5 provinces and 6 regencies had limited implemented the system and most of them just in tender notification stage (e-announcement) only. In 2008, there were just 12 among 33 province and 16 from about 493 regencies/cities all over Indonesia who begun adopting the e-procurement. This condition shows that there are any obstacles and barriers causing most of Local Government in Indonesia have a slow progress in adopting the system. It also let Authorities still loosing any potential budget efficiencies

and it was contrary to the spirit of the Government to eliminate corruption-collusion and nepotism. These possible barriers need to be identified and analyzed to know their root-cause in according to determine any possible resolving strategies. Objectives of this research are identifying those barriers and calculate their relative strength/influence in obstructing the implementation of the system, according to respondent's perceptions. These findings will be input for the Government of Indonesia to conduct any strategies needed to perform an optimal e-procurement system implementation.

2. RESEARCH SCOPE AND METHODOLOGY

This research was done in all regencies/cities in Province of Lampung. This province will be a good sample of local authorities that still has no action to implement the e-procurement system yet. In the other side, this province is the nearest outside-Java island province to the Capital City of Indonesia, Jakarta. This strategic location brought this province as an important path of national information of technology. The unimplemented e-procurement in this province, especially in regency/city level, is clearly an anomaly and it can be assumed that this phenomenon could appear in other area of Indonesia. Identification of barrier factors was done by reviewing many relevant literatures. And to assess influence weight of each barrier, a multi-criteria decision making method (*Analytic Network Process*/ANP), is used. The choosing of ANP is because this method is very effective in calculating relative weight of criteria based from respondent perceptions, by accommodating any possible relationship among those criteria/elements. The use of ANP is also to construct a problem network model that allows any dependencies among barrier factors and to establish all questions that should be filled in by respondents (see Figure 1).

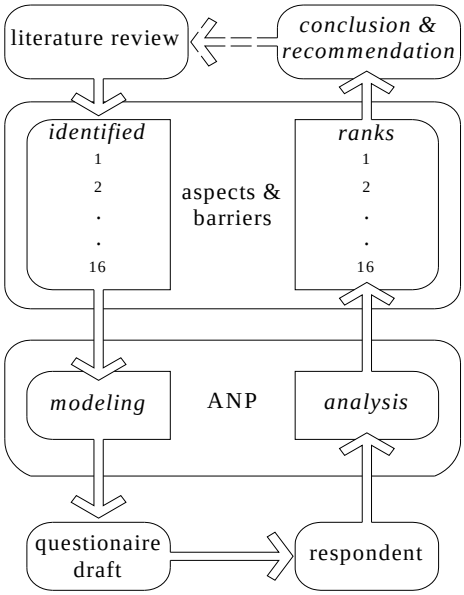

Figure 1: Research scheme

3. LITERATURE REVIEW

This section describes any results from literatures review that relevance to e-procurement system such as definition, benefit, and any potential barrier factors in implementing the system.

3.1. Definition of e-Procurement

There many definition of e-procurement. Referring to The World Bank (2003), e-procurement in general has the meaning of the use of IT by the Government in tendering of their projects. Davila et al (2003) defined procurement as a process of procurement whether in private or public tender, through internet connections. While Liao et al (2002) said that e-procurement basically is the more efficient and effective digitalized format compare to conventional paper-based procurement. Meanwhile Kaliannan et al, (2006) defined e-procurement as a comprehensive IT process used by Government to get their goods/services. According to Civil Works Minister Rules no. 207/PRT/M/2005 about Procedures of Electronic Procurement in Government's Construction Services, e-procurement is an electronic process of tendering process based on web network using IT facilities.

3.2. Benefit of e-Procurement

From many literatures, can be seen clearly the benefits of e-procurement implementation. Improvement the performance of national procurement system, in many cases, can provide more saving which may exceed the initial cost of investment and can leave a significant amount of money that can be allocated for other social expenditure. Enhancing efficiency and transparency in procurement can also increase Government's reliability and credibility (OECD & The World Bank, 2005; Kierkegaard, 2006). E-Procurement can also enable to evaluate supplier performance automatically; provides any statistical data and information that will be very important in development plan and decision making; reduction in cost for operational and tender process; availability data for new product and create reliable and competence unit cost. The amount of research from: Hiller & Belanger, 2001; Layne & Lee, 2001; Neef, 2001; Reddick, 2004; Davila et al, 2003; Moon, 2003; Gansler et al 2003; Barbieri & Zanoni, 2005; Chircu and Kauffman, 2000; Vaidya, K et al, 2006 (summarized in Kaliannan et al, 2006) find that there are many benefits of e-procurement. The benefits can be summarized as: reduce in operational and administrative tender

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cost (efficiency) for the government, especially for supplier; more democratic tender process will be enabling interaction with supplier from other administrative area (*wider span of control & larger business opportunities*) through internet (*anytime, anywhere, and the inconvenience of traveling to the government office*); enhance responsibilities in tender process; reduce staff assigned in tender activity (*lean management structure*); retrenchment the Government budget that resulted from fair and transparent process of tender; opportunities for small and medium enterprises to get any government projects; more environment sustainability (paperless process); and reduce any duplication of works in tender process. Pujani & Xu (2006) found that web-usage in small and medium enterprises in Indonesia, mostly just as information function rather than a transaction infrastructure (*order online, online payment*). This condition shows that consumers still concern about security, legal, and privacy factors that needed in online transactions. Whereas, small and medium enterprises has aware and realize about any benefit (such as improve sales-rate and span of business, interesting ROI, efficiencies and cost reductions, improve services, enhance business relationship with consumers, etc) that can be resulted through the use of web system in their business.

3.3. Barriers of *e-Procurement* Implementation

Davila et al (2002) stated that e-procurement barriers are strictly depends on characteristics of the enterprise/organization who will adopt the system. These barriers are: problems in integrating e-procurement into the existing system; lack of standard for further development; the lack of supplier accessibilities which is leads to inappropriate market mechanism; suppliers reluctant to involve in tight price competition ; suppliers not interest because of worried to have loss control on brand product; there are a rift for hackers and potential loss of data and confidential information; lack of faith in transaction and data integrity; assumption that expenses in integration of e-procurement is not worthy enough compare to its benefit; lack of organizational preparedness; organization cultures; and lack of enthusiasm among company officials or key stakeholders. While the Asia Foundation (2003) describes some barriers such as cost for adoption, data & transaction security, lack of regulations, hard to implement the new system in organization, lack of knowledge and IT skills, and low capabilities of funding for operational and maintenance. Shackleton (2006) stated the most influencing factors in implementing e-procurement are legal and regulation obstacle, cost, technological transition, and discrepancy digital. Other factors such as structural reform, customer services process reform, and priority of the local authority policies. Karanasios et al (2006) classifies e-procurement barriers from user view point into resources barriers (implementation cost and limited time to learn IT, lack of quality and quantity IT skilled staff, lack of advises from expert, lack of external supports), management barriers (immature/improper plan and short-range perception), benefits barriers (limited appreciations to e-procurement benefit). Meanwhile Kaliannan et al (2006) stated any barrier in implementing e-procurement in Malaysia, among other are: 1. cost, include amount of cost for capital expenditure to become e-procurement enabled such as pay for training, renewal the system, registration cost, etc. 2. Infrastructures and skills, such as lack of bandwidth support, poor computerize systems, and poor personal quality and IT knowledge. 3. Business focus/change management, where enterprise prefer to do business with conventional ways. 4. System constraint, where user can only register some of their product for free, otherwise will be charged. 5. Government policy such as improper regulation to hinder any conflict in implementing the system. Eadie *et al.,* (2007) has summarized some e-procurement barriers in construction industry in Northern Ireland, which result is almost similar with the research conducted in Australia by Hawking et al (2004). Those barriers are legality of e-procurement, working culture in an organization, managerial and superior supports, IT infrastructure, implementation cost, IT expert advises, lack of IT skilled staff, low-relationship with supplier in e-procurement implementation, transactional security, low appreciation to the hidden benefit, and compatibility of the system. Martin (2008) stated some e-procurement barriers in England like the lack/gap of system standard, technical and legal aspects, cost, infrastructures, technological requirements, suitability systems, and resistance from stakeholder. Refer to many literatures and by considering any context and condition on Indonesian Government procurement, can be summarized sixteen e-procurement barriers that assumed could happened in Indonesia and will be evaluated in this research. These barriers are: *Regulation* and *Security* on Legal Aspect; *Standard*, *Integration*, *Infrastructure*, and *Complexity* on Technical Aspect; *Benefit*, *Cost*, *Coordination*, *Culture*, *Management*, *Planning*, *Leadership*, and *Policy* on Institutional Aspect; *Skill* and *Enthusiasm* on Human Resources Aspect. Then a network structure of these barriers is constructed, included any possible relationship among them (figure 2), using *Super Decisions 1.6.0*.

This model and relationship patterns will be basic for further ANP analysis. Because there is no previous research that can be based to establish any logical dependencies among these barriers, so it is assumed that each barrier has affects to another, whether in its group (known as inner dependencies,

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and shown with an arc lined arrow) or outside its group (known as outer dependencies, shown with a straight line arrow).

4. ANALYSIS AND DISCUSSION

Analytic Network Process (ANP) is a comprehensive method to analyze multi-criteria/factors to get a good decision, which is developed from AHP (*Analytic Hierarchy Process*) method. ANP method enables the involvement of any possible criteria/factors that may influence in making a good decision. Interactions or dependency responds could be happened, both among elements in one cluster (inner dependencies) or among elements outside the cluster (outer dependencies) (Saaty, Rozann W., 2003). Calculation process in ANP has some stages, there are: modeling network problems structure, pairwise comparison matrix between elements/cluster, establishing the weight of all elements/clusters, inconsistency checking through calculating consistency index (CI) and consistency ratio (CR), establishing global weight of all elements by constructing and calculating the super matrix (un-weighted, weighted, and limiting super matrix). (Hetharia et al, 2008; Huang, 2008; Isik et al, 2007; Saaty, 2004). In this research the analysis was done based on the established model in figure 2, and used software called Super Decisions 1.6.0. Through the model, we can arrange any questions that have to be answered completely, and then these questions are transformed as a questionnaire that should be filled by respondents. After collecting data from respondents through the questionnaires, all the answers were passed through some validation check. Then they can be included into ANP assessment. The model shows that each factor (criteria/element) influences other factors, within or across its aspect. This condition shows that an aspect being compared against another with respect to itself as the parent cluster/context. According to Saaty (2003) this condition happens when the cluster exhibits inner dependence. As an example, Institutional Aspect is compares against Legal Aspect to obtain which aspect has more influenced in raising any factors on Institutional Aspect, as parental context (Table 1).

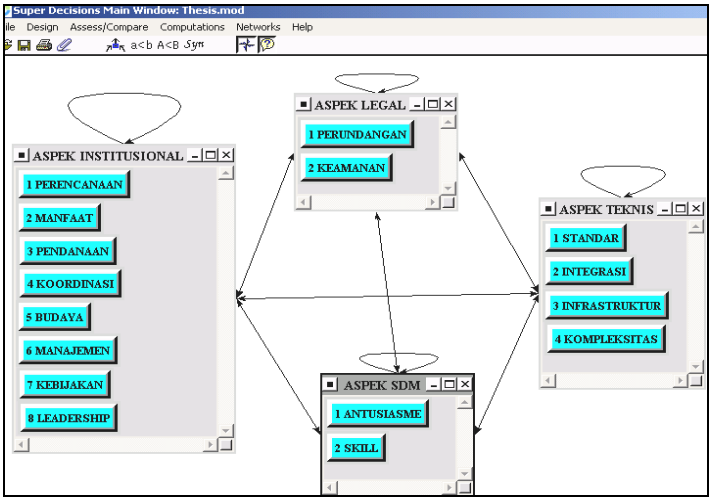

Figure 2: Network model (ANP) of e-procurement adoption barriers (*Super Decisions 1.6.0*)

Table 1: Pairwise comparison in Institutional Aspect as parental context

Institutional Aspect	A	B	C	D
Institutional (A)	1	3	2	2
Legal (B)	1/3	1	1	1/2
Human Resources (C)	1/2	1	1	1/2
Technical (D)	1/2	2	2	1

Whereas inconsistency value of respondent judgments for this example is 0.0172 $\leq$ 0.1 (It means consistent) that resulted using *Super Decisions 1.6.0* (see figure 3).

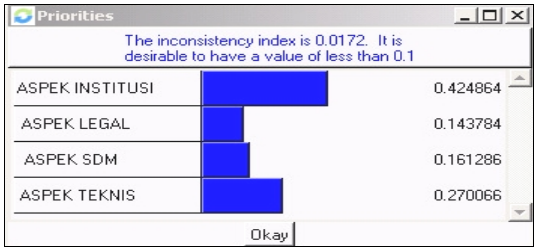

Figure 3: Local weights of all aspect respect to Institutional Aspect (Super Decisions 1.6.0)

The same calculations also conducted according to other three aspects and after get all their local weights for each aspect in the context of each aspect, furthermore each weights then being normalized to obtain weight of real influence globally (Table 2).

Table 2: Global weight and rank of each aspect after normalized

ASPECT	Local weight in parental context					Global	
	(A)	(B)	(C)	(D)	Sum	Weight	Rank
Institutional (A)	0.42488	0.33333	0.40180	0.28571	1.4457205	**0.361430**	1
Legal (B)	0.14378	0.16667	0.09725	0.28571	0.6934126	**0.173353**	3
Human Resources (C)	0.16130	0.16667	0.16396	0.14286	0.6347799	**0.158695**	4
Technical (D)	0.27005	0.33333	0.33699	0.28571	1.2260870	**0.306522**	2
				SUM	4.00000	1.000	

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The weight calculation in any barrier factor/element level can also be done by comparing each other pairwisely. Here is an illustrative process of weight calculation for barrier factors in implementing e-procurement by taking "*planning*" barrier as a sample. "*Planning*" barrier is a member of institutional aspect, where it means that there is no adequate strategic plan in adopting or implementing the e-procurement system on an organization. The objective of "*planning*" barrier calculation is to obtain the influence weight of any barrier on every aspect, in according of the appearance of this *Planning* barrier. For weight calculation of barriers on Institutional Aspect, the first step is to input respondent's answer into matrix as shown in Table 3 below.

Table 3: Weight assessment in Institutional with respect to *planning* barrier

	A	B	C	D	E	F	G
Benefit (A)	1	1	2	1	2	1/2	1
Cost (B)	1	1	3	1	1	1	1/2
Coordination (C)	1/2	1/3	1	1/3	1/2	1/2	1/2
Culture (D)	1	1	3	1	1	1	1/2
Management (E)	1/2	1	2	1	1	1	1/2
Policy (F)	2	1	2	1	1	1	1
Leadership (G)	1	2	2	2	2	1	1

	Normalized							Sum	Weight
	A	B	C	D	E	F	G		
Benefit (A)	0.1388	0.1596	0.1518	0.1596	0.1566	0.1550	0.1483	1.069736	0.152819
Cost (B)	0.1488	0.1368	0.1429	0.1368	0.1401	0.1439	0.1483	0.997569	0.142510
Coordination (C)	0.0678	0.0684	0.0625	0.0684	0.0687	0.0646	0.0697	0.469996	0.067142
Culture (D)	0.1488	0.1368	0.1429	0.1368	0.1401	0.1439	0.1483	0.997569	0.142510
Management (E)	0.1289	0.1205	0.1250	0.1205	0.1154	0.1273	0.1213	0.859007	0.122715
Policy (F)	0.1686	0.1694	0.1607	0.1694	0.1813	0.1550	0.1753	1.179653	0.168522
Leadership (G)	0.1983	0.2085	0.2143	0.2085	0.1978	0.2103	0.1888	1.426469	0.203781
							Sum	7.00	1.00

Table 4: E-Procurement barriers rank and weight according to respondent groups

RANK	GLOBAL		USERS		SUPPLIERS	
	BARRIERS	WEIGHT	BARRIERS	WEIGHT	BARRIERS	WEIGHT
1	REGULACY (I)	0.093317	REGULACY (I)	0.114557	SECURITY (J)	0.109723
2	INFRASTRUCTURE (O)	0.091498	INFRASTRUCTURE (O)	0.103251	COMPLEXITY (P)	0.097545
3	SECURITY (J)	0.089455	STANDARD (M)	0.091462	SKILL (L)	0.097215
4	COMPLEXITY (P)	0.082128	ENTHUSIASM (K)	0.073967	REGULACY (I)	0.086816
5	SKILL (L)	0.081491	SECURITY (J)	0.073939	INFRASTRUCTURE (O)	0.075170
6	ENTHUSIASM (K)	0.075733	COMPLEXITY (P)	0.070525	ENTHUSIASM (K)	0.069636
7	STANDARD (M)	0.068031	SKILL (L)	0.068089	PLANNING (A)	0.060888
8	PLANNING (A)	0.060099	INTEGRATION (N)	0.059536	BENEFIT (B)	0.053792
9	INTEGRATION (N)	0.055132	PLANNING (A)	0.056271	COST (C)	0.051547
10	BENEFIT (B)	0.050398	COST (C)	0.049379	MANAGEMENT (F)	0.046907
11	COST (C)	0.050162	BENEFIT (B)	0.049122	LEADERSHIP (H)	0.046048
12	LEADERSHIP (H)	0.045980	LEADERSHIP (H)	0.046338	STANDARD (M)	0.045857
13	MANAGEMENT (F)	0.042970	POLICY (G)	0.040077	CULTURE (E)	0.044353
14	CULTURE (E)	0.042057	CULTURE (E)	0.037948	POLICY (G)	0.044036
15	POLICY (G)	0.041791	MANAGEMENT (F)	0.036820	INTEGRATION (N)	0.043551
16	COORDINATION (D)	0.029758	COORDINATION (D)	0.028719	COORDINATION (D)	0.026913

Because of this matrix is a reciprocal matrix, so if "A" has twice more preferred than "E", then it would inverted diagonally so value of "E" will be a half less value than "A", and so on. After the matrix is filled completely, the matrix then will be multiplied and normalized to obtain the influence weight and rank of each barrier on Institutional Aspect with respect to *planning* barrier as the parental context. Using *Super Decisions 1.6.0*, the inconsistency ratio of respondent's judgments can be obtained, that is 0.0297, and it is less than 0.1 (the maximum acceptable level of inconsistency). The same calculation can be also done to all barriers in other aspects to establish their influence weight with respect to *planning* barrier. By doing the same assessment to other fifteen barriers, and after their local weights with respect to each barrier have resulted, then we can place all of these value into a big matrix (called super-matrix), which is to be an especial process of ANP method. There are three super-matrixes; the initial super-matrix is un-weighted super-matrix. This matrix purely contains their relatives' independence weights with respect to all barriers, and doesn't show a global value yet. Other

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two super-matrixes are weighted super-matrix and limiting super-matrix. Weighted super-matrix contains a global weight of all barriers according to their aspect, by multiply each value in un-weighted super-matrix with their affiliated aspect weights. Next process is limiting super-matrix. This matrix is created by raising the weighted super-matrix to powers until it stabilizes. ANP calculation also conducted in both group of respondents, Government as the user and contractor/consultant as supplier, and the final results based on that groups can be seen in Table 4. Since ANP can accommodate any relationship among barriers in it calculations, this method can also show all factors/barriers that become a trigger for one barrier.

5. CONCLUSIONS

Resulted from ANP calculations and analysis based on respondent perceptions, it can be seen that there are many differences among groups of stakeholder about barriers in e-procurement implementation. For Users (Government), the five most influencing barriers are: (1) *Planning*, (2) *Infrastructure*, (3) *Standard*, (4) *Enthusiasm*, and (5) *Security*. While for Suppliers, the five most influencing barriers are (1) *Security*, (2) *Complexity*, (3) *Skill*, (4) *Regulation, and (5) Infrastructure.* Both of groups also have their own perceptions about what barrier factors that may become triggering to all barriers mentioned above. According to the total respondents, the most five influencing barriers with their own triggering factors are (1) Regulation (It's trigger factors are: *Security*, *Enthusiasm*, *Skill*, and *Infrastructure*), (2) Infrastructure (it's trigger factors are: *Regulation*, *Security*, & *Complexity)*, (3) Security (It's trigger factors are: *Regulation*, *Standard*, *Skill*), (4) Complexity (It's trigger factors are: *Security*, *Skill*, *Infrastructure*), and (5) Skills (It's trigger factors are: *Enthusiasm*, *Infrastructure*, and *Complexity*). Expected from knowing these barriers and their own triggering factors, the Government of Indonesia and all local authorities could conduct any strategies included any anticipative acts that should be done in order to perform an optimal implementation of e-procurement system in their administrative area.

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