Socio-Technical Analysis of Indonesian Government E-Procurement System Implementation

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Abstract: *E-governance has become increasingly important to deliver better public services, and increase public trust. One of Indonesia's e-government reform initiatives was to improve public spending efficiency through public e-procurement system. It is argued that an effective national e-procurement system will potentially generate great savings in the government expenditure, assist in delivering better public services and increase trust. Despite the reform, Indonesia's public e-procurement has not been very successful due to socio-economic problems. With a specific focus on e-procurement and the issues of transparency and accountability in Indonesia, this research aims to investigate the role and barriers of information technology in enhancing information transparency and accountability to the public. Actor-network theory and the notion of delegation approach are employed in this research. Six semi-structured interviews were conducted with the developers and management of Indonesia Government e-Procurement System, which includes the e-Procurement Directory staff in the Institution of Government Procurement Policy (IGPP), and the users of an e-procurement system. This research concludes that information technology was delegated to automate the procurement process to increase transparency, accountability and prevent fraud. However, barriers of e-literacy, lack of leadership, a reluctance of implementation, and lack of infrastructure created obstacles to attain the goals. This infers that social and technical aspects are interrelated and empower each other to support the technology in enhancing information transparency and accountability. This research suggests that there should be an increased collaborative approach between the developers and users in the application development and implementation to improve e-procurement system implementation to achieve transparency and accountability.*

Keywords: *E-Procurement, Transparency, Accountability, Actor-Network Theory, Delegation, Role, Barriers*

Abstrak: *E-governance telah menjadi semakin penting untuk memberikan layanan publik yang lebih baik, dan meningkatkan kepercayaan publik. Salah satu inisiatif reformasi e-government Indonesia adalah untuk meningkatkan efisiensi belanja publik melalui sistem e-procurement publik. Dikatakan bahwa sistem e-procurement nasional*

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yang efektif akan berpotensi menghasilkan penghematan besar dalam pengeluaran pemerintah, membantu dalam memberikan layanan publik yang lebih baik dan meningkatkan kepercayaan. Meskipun reformasi, e-procurement publik Indonesia belum berhasil karena masalah sosial-ekonomi. Dengan fokus khusus pada e-procurement dan isu transparansi dan akuntabilitas di Indonesia, penelitian ini bertujuan untuk menyelidiki peran dan hambatan teknologi informasi dalam meningkatkan transparansi informasi dan akuntabilitas kepada publik. Teori jaringan aktor dan gagasan pendekatan delegasi digunakan dalam penelitian ini. Enam wawancara semi-terstruktur dilakukan dengan pengembang dan manajemen Sistem e-Procurement Pemerintah Indonesia, yang mencakup staf Direktori e-Procurement di Lembaga Kebijakan Pengadaan Pemerintah (LKPP), dan pengguna sistem e-procurement. Penelitian ini menyimpulkan bahwa teknologi informasi didelegasikan untuk mengotomatiskan proses pengadaan untuk meningkatkan transparansi, akuntabilitas dan mencegah penipuan. Namun, hambatan e-literacy, kurangnya kepemimpinan, keengganan implementasi, dan kurangnya infrastruktur menciptakan hambatan untuk mencapai tujuan. Ini menyimpulkan bahwa aspek sosial dan teknis saling terkait dan memberdayakan satu sama lain untuk mendukung teknologi dalam meningkatkan transparansi informasi dan akuntabilitas. Penelitian ini menunjukkan bahwa harus ada peningkatan pendekatan kolaboratif antara pengembang dan pengguna dalam pengembangan aplikasi dan implementasi untuk meningkatkan implementasi sistem e-procurement untuk mencapai transparansi dan akuntabilitas.

Kata kunci: *E-Procurement, Transparansi, Akuntabilitas, Teori Aktor-Jaringan, Delegasi, Peran, Hambatan*

1. Introduction

1.1 *Research Background*

The Asian financial crisis in the late 1990s enforced the Indonesian government to increase their public sector's transparency and accountability and gain a stable economic condition (World Bank, 2001; Heeks, 2003). Information technology (IT) in public sector open new ways of public management through e-government to deliver better public services, enhance communication between citizens and government, and improve citizen participation which eventually increases citizen trust (Tolbert and Mossberger, 2006). IT also increase efficiency in internal management processes by shifting from traditional bureaucratic organization paradigm to an e-government paradigm with

competitive and knowledge-based requirements such as flexibility, network organization, innovation, organization learning, and customer-driven strategy (Ho, 2002 in Ndou, 2004).

However, there are challenges specifically for developing countries to conduct good government governance. Based on the United Nations E-Government Survey 2010, Indonesia was ranked 109th amongst the 184 countries assessed regarding e-government development index, due to the lack of infrastructure, political will, and competent human resources (United Nations, 2010). This condition initiated Indonesia's government commitment to develop and implement e-government policy to "improve its relationship with citizens and the business sector through enhanced, cost-effective, and efficient delivery of services, information, and knowledge using IT" (Mirchandani, Johnson Jr, and Joshi, 2008, p. 483).

One of Indonesia's e-government reform initiatives was to improve public spending efficiency through public e-procurement system (World Bank, 2001). As one of Indonesia's central economy driving factor with an annual volume of procurement of around US$ 10 billion, the effective national e-procurement system will potentially generate significant savings in the government expenditure. Thus, this research will focus on Indonesian Government e-procurement reform, more specifically on the role of technology and the identification of barriers to transparency and accountability of the e-procurement system.

1.2 Research motivation and research questions

There have been discussions about the importance of information transparency and accountability in public management (governance). Audit practice through check and balance becomes essential to ensure social transparency and accountability. Further, an audit can also build public trust due to the increase in fraud, and corporate failures, which intensified the demand for a financial audit to establish good governance (Power, 1997). Indonesia's ineffective public procurement system incurs a higher cost and leads to poor project performance. Moreover, the decentralization reform which gives the local government rights to disperse their decision making closer to the citizens, enhance

the complexity in monitoring local procurement projects, which create an uncompetitive business environment (OECD, 2007).

The Indonesian government together with donors such as the United States Agency for International Development (USAID) initiated the use of IT to facilitate e-procurement to enhance public service and access to Indonesia's rural areas. Despite the reform, Indonesia's public e-procurement has not been very successful due to socio-economic problems and the digital divide (World Bank, 2001; OECD, 2007). Indonesian Anti-Corruption Commission has reported the occurrence of 50 procurement irregularities cases in 2011, which has caused 35% loss of the project value (Indonesia Procurement Watch, 2011).

As IT may represent a high risk in developing countries, its implementation to bridge the power distance between civil servants and the public must be monitored with higher norms and integrity. Moreover, given the diverse socio-economic condition of the country, and involves challenges which go beyond the technology, demanding organizational structures, skills, leadership, and partnerships (Ciborra, 2005; Allen et al., 2001). Therefore, the relationship and network developed between the stakeholders (actors), social, and technical aspects involved in the government IT reform must be analyzed to understand the technology roles and challenges in accommodating the social demand of information transparency and accountability.

This research **aims** to analyze the role of IT in increasing e-procurement transparency and accountability using the actor-network theory approach. Specifically, this research aims to capture insights from technology developers and users to understand the role of technology in fulfilling the e-procurement reform goals. Following the research aims, below are the **research questions:**

1. How is the adoption of technology meant to enhance transparency and accountability for the e-procurement system's users?

2. What are the developer's insights into the barriers to transparency and accountability of the e-procurement system?

3. What are the users' insights into the barriers to the transparency and accountability of the e-procurement system?

This research proceeds with the following chapters: chapter two provides critical literature review; chapter three describes the research methodology; chapter four describes the case study results; and chapter five concludes this research by ummarizing key points, contributions, research limitations and recommendation for future work.

2. **Theoretical Framework**

2.1 Indonesia e-procurement reform

Public procurement reform was one of the key efforts to increase efficiency in public spending and establish an efficient, transparent, accountable and more predictable system which improves the integrity of procurement process (World Bank, 2001). As part of the national reform, in December 2004 World Bank and Organization for Economic Co-operation and Development-Development Assistance Committee (OECD DAC) together with developing countries (including Indonesia) and donors initiated the development of a set of tools and standards which guides the improvement and assessment of the national procurement systems (OECD, 2007). Regarding Indonesia's huge annual volume of public procurement value of around US$ 10 billion (1 US$ = 8,660 IDR), the effective national procurement system will potentially generate significant savings in government expenditure and improve economic condition (World Bank, 2001). Moreover, the manual procurement procedure is susceptible to irregularities and enforced Indonesia's government to shift procurement service into a market driven system through IT implementation to deliver transparent and accountable contents and services to the citizens (Chen, 2002). As the importance of procurement reform increased, a national e-procurement application was developed to facilitate transparent and accountable procurement system in Indonesia.

As part of the seven Flagship of The National Information Technology Board Republic of Indonesia, the Institution of Government Procurement Policy (IGPP) was established in 6 December 2007 under the Presidential Decree 106/2007 to create an efficient and effective spending of state budget, increase the human resource

competency in e-procurement, and increase the capacity of IGPP as a policy and decision maker (IGPP, 2010). In the first years of its implementation, 44 E-Procurement Services Units (EPSU) were established in 2008 and 2009, and in December 2010 this increased to 128 EPSU which served 244 governmental institutions in 25 provinces across Indonesia (IGPP, 2010). To enforce transparency, accountability, and efficiency in e-procurement, EPSU provides an integrated application, which consists of four modules, which are e-purchasing, e-tendering, e-audit, and document security application (IGPP, 2009).

2.2 *Information transparency, accountability, and barriers in Indonesian e-procurement*

"Transparency and the right to access government information are now internationally regarded as essential to democratic participation, prevention of corruption, decision-making, and provision of information to the public, companies, and journalists, among other essential functions in society" (Shuler, Jaeger, and Bertot in Bertot et al. 2010, p. 264). Moreover, IT has claimed to reduce the cost of collecting, distributing, and accessing government information thus provide government, citizens, and businesses greater access to information (Roberts, 2006; Anderson, 2009; Fuchs, 2006 in Bertot et al., 2010).

In e-government, transparency is delivered through proactive government dissemination to release of government materials, public meeting and protection for whistleblowers (Shim and Eom, 2008). Regarding accountability, IT enables greater citizen participation in politics and decision making, increasing government responsibility to accommodate citizen aspiration and represent their views and interest in governing the nation (Kumar, 2002). An example of the effort to enforce transparency and accountability can be seen in India where e-government has facilitated online rural property records which increased the speed of record access and prevent bribery (Bhatnagar, 2003a). This effort managed to improve processing efficiency, decrease processing cost and time to almost 90%.

The delivery of transparent data, the security of networks, confidentiality of information, and reliability and verifiability of information facilitates government accountability to the citizen (Welsch and Hinnant, 2002). Citizen participation in e-government increases and is supposed to enhance process-based (responsiveness and information accessibility) and institutional-based trust (information transparency and government responsibility) (Welch, Hinnant, and Moon, 2005,). However, trust in government has declined from the past few years due to a financial crisis, terrorism, and unstable economic condition (Welsch and Hinnant, 2002; Tolbert and Mossberger, 2006; Norris, 2001). Moreover, previous findings state that IT utilization does not guarantee to increase transparency and accountability but may open new opportunities for corrupt behaviors instead (Heeks, 1998, cited in Bertot et al., 2010).

Internal resistance to transparency, creation of new means of corruption through IT, literacy rate, technology infrastructure, and digital divide are amongst the common barriers to e-government reform (Tolbert, 2006; Bertot, 2003; Heeks, 2003). Further, Bhatnagar (2003) argues that many governments that implemented e-government experience these problems and requires the integration of system design to build political will of the participants, increase access to information, and build the ability to trace government decision.

Procurement corruption cases are the most cases handled by the Anti-Corruption Commission Republic of Indonesia, in which 2,100 cases were reported in 2009 (Indonesia Procurement Watch, 2011). Moreover, Jasin (2008, p. 61) also stated that "surveys performed by separate and independent institutions (including CPAR, the World Bank, the Asia Development Bank, as well as the Government of Indonesia) estimate the incidence of corruption in public procurement to be anywhere from 10% to 50%. In 2007 then, the highest estimate of corruption would have been about Rp. 120 trillion (equivalent to US\$ 12 million), or more than 15% of the total 2007 budget, just from the public procurement sector." This infers that due to the complex and dynamic landscape of e-procurement, accountability and transparency becomes a great challenge.

2.3 Actor-Network Theory

Actor-Network Theory (ANT) has recently gained significant use in the field of information system research, emphasizing on the social-human-technology interaction which shapes the network of humans and non-humans to produce a collective outcome (Elbanna, 2003; Latour, 1987). ANT has also been claimed useful in the study of IT to organizational studies (Bloomfield and Coombs, 1992) and other fields such as accounting (Briers and Chua, 2001), and information systems (Walsham and Sahay, 2006). This sector will further explain ANT that is used in this research.

2.4 Actors and networks

Actors in forms of texts, technical artifacts, human skills, and institutions play a central role in the networks and define the relationships between each other (Stanforth, 2007). Scientific and technological innovation, social patterns and organisational arrangements are to be stabilised through the network and interaction of human and non-human where conflicts and controversies can be overcome through translation of actors' interests, persuasion, and the enrolment of network and the mobilization of resources (Callon, 1986; Law, 1992; Latour, 1987). In this way, the scientific and technological innovation reflects the societies as they are shaped by the interaction of actants within the networks (Bijker and Law, 1992; Law, 1999).

ANT ascertains that all actors play a significant role in the heterogeneous elements in the networks. As the actors collaborate in the network, the "volitional actor" of ANT named "actant" associate and disassociate with other agents, enter networks which then define and provide them with substance and identity of intention and action (Ritzer Encyclopedia, 2004). Through this interaction, actants derive their substance and nature, develop networks and reside in other networks. The success of these processes is determined by the interaction of local and global network.

Law and Callon (1992) define local networks as networks of relations inside the project which determine the success of the project, and global network is situated outside the project to support local networks such as by providing resources and political support. Both networks interact through intermediaries of "obligatory point of passage"

which also acts as the "locus of control". The optimum utilization of resources provided by the global network to build and maintain local networks to offer reciprocal results to the global network, and appoint the project as the obligatory of passage between networks determine the success of projects.

2.5 *Translation and power*

To establish a secure network and relation of actants, the translation process involves the power to stabilize social asymmetry and disputes between actors to align interests. The interaction process generates power which is translated into a command resulting from each agent who translates the power into their own desired outcome (Callon, 1986). Therefore, "ANT can also be considered a theory of the mechanics of power: the stabilization and reproduction of some interactions at the best of others, the construction and maintenance of network centers and peripheries, and the establishment of hegemony" (Ritzer Encyclopedia, 2004, p. 2).

Power persuades of translation through deformation of concepts and acts, which differ from diffusion as networks become more concentrated through iteration of actor-network relation. Callon (1986) explored this notion through the study of an actor-network of scallop fishermen of Saint Brieuc Bay in France and concluded the importance of social analysis and translation of power, which consist the process of problematization, interest, enrolment, and mobilization. Problematisation occurs when agents interact with actors to explain the problematical situation and the consequences. Agents create an agency which relates to the powerful influence for actors and networks to align interest through oral explanation or actions which influence the actors to act and connect with each other (Callon, 1986). These agents connect two entities through activities which aimed to produce the desired outcomes. In this way, the actors' interests are aligned, and they become convinced to accept the idea of the situation, thus enrolling them into the power and identities, which relates in the network.

Further, eventually mobilizing the actors through the wide acceptance of the context, which stabilizes the network through an obligatory point of the passage. This infers that technology reflects our society since it embodies social, economic, political

and other factors through the translation process. Thus, technology can take different forms and is contingent to the stabilization process of heterogeneous relations of actants within and between networks (Bijker and Law, 1992).

2.6 *Delegation and durability*

Society is held together by heterogeneous means of natural, technological, textual and topographical factors (Law, 1999). This is known as socio-technical order where social and technical cannot be differentiated in a way that we cannot identify what is social and what is technical in a situation. Thus, it is true that organizations, social relations, and technology are interrelated and often assumed able to support organization development (Bloomfield, 1995) and possess the political strength to stabilize and translate organization processes (Akrich, 1992).

The notion of delegation refers to transferring roles, values, intentions, and rules to technological artifacts or machines (Akrich, 1992; Latour, 1992). The roles and functions of humans are delegated to technology to create social durability (Latour, 1991) through the development of machines and technology which embeds social and organizational role previously performed by human actors. This delegation was initiated to create social durability and discipline the society by tying humans to moral laws and build social morality. Latour (1988) explains this notion through the example of innovation of the door stopper for the La Villette's people to substitute the unreliable human role for opening and to close the door. Technology can also be understood as the result of human and non-human actants in a network which encompass the user's values and designate moral order to manage intended usage and anticipate misuse of technology (Akrich, 1992). This is why technology is widely used to enforce control in the society ranging from technology for everyday use; traffic lights and seatbelt, to specific technology developed for public and state governments such as e-government and e-learning application. However, technology does not control social relations, they only to some extent mediate and reinforce them (Bloomfield, 1995).

2.7 *Linking ANT to Indonesian e-procurement transparency and accountability*

The e-procurement system results from the interaction and collaboration of various stakeholders with different interests which are aligned through the translation process. The technology and features translated within it were delegated to ensure safe and reliable procurement process and prevent any deviations which were prone to occur in the manual procurement system. Referring to the politics of technology, Marcuse (1964) in Bloomfield (1995) stated that politics are exercised based on the dominant society interest and represents the use of information in contextual terms which denies the concept of technology neutrality. The application development also involves presupposing the user's condition in which the change in social relations is prefigured if the process of technology constructed. Thus, there may be unintended outcomes from the implementation such as users' resistant and users who do not conform to the intended script inscribed in the technology, which questions the moral order of technology presupposed. Related to this, this research will refer to the notion of delegation and actor-network theory to study the role of IT in Indonesian e-procurement system to establish a transparent and accountable process, and also study the barriers of in enforcing transparency and accountability for the public procurement. The next chapter will explore the research methods of this research.

3. **Research Methods**

3.1 *Research method and design*

This research employs a qualitative research method. "Qualitative research involves the collection of a variety of empirical materials-case study, personal experience, introspective, life story, interview, observational, historical, interactional, and visual texts that describe routine and problematic moments and meanings in individuals' lives" (Denzin and Lincoln, 1998, p. 3). Research design links the data collected to the determined research question to form a research action plan. To address the research questions, this research employs a case study on Indonesian e-procurement, to provide a deep and rich explanation of the phenomenon. Semi-structured interviews and document analysis were done to gather the data.

3.2 Data collection method

In-depth and semi-structured interviews support an exploratory study to study a phenomenon, gain new insights and understand how and why those phenomena happen (Saunders, Lewis, and Thornhill, 2003), which is relevant to the aim of this research. Compared to structured interviews, which are standardized, semi-structured interviews is more appropriate to allow in-depth exploration into the research topic and allow flexibility to ask further questions. Due to the limited research timeframe, the interviews have been conducted by telephone, which was recorded and transcripted.

Semi-structured interviews have been conducted with the developers and management of Indonesian Government e-Procurement System which includes the e-Procurement Directory staff in the Institution of Government Procurement Policy (IGPP). Interviews were also conducted with the users of e-procurement system: one of the EPSU in Java and one of EPSU in Kalimantan. Two staff from each organization will be interviewed. Thus, there are six interviews in total. The author gathered preliminary information from the documents (published materials) from IGPP and EPSU website to understand about the project and research contexts. Before the interviews, research consent forms were given to the interview respondents to provide a research outline and research ethics considerations to be agreed upon.

3.3 Analysing and validating data

Analysis and validation of evidence is the most crucial part of case studies in generating findings, justifying assumptions and answering research questions through examinations, and tabulations of results (Yin, 1994). After conducting interviews, it is essential to conduct early data analysis to review possibilities of collecting new data to fill in gaps and to keep track of the interim results. The researcher adopted the contact summary sheet method by Miles and Huberman (1994) for the semi-structured interviews to validate the categorization of results based on the actor-network theory used in the analysis. This enables the author to focus on the relevant information which confirms the theoretical propositions used to design the case study and research scope (Yin, 1994).

4. Results and Discussion

4.1 Actors and networks

To study the roles and barriers of technology in the e-procurement system, it is first necessary to identify the actors and their relationships in the e-procurement application development and implementation. Law and Callon (1992) describe local networks as the network which defines the success of the project and global network as the supporting network outside the local network. In this research, global network supplies the local network with the application, regulation, norms, standards, manuals, and training which empower them to independently operate the system and provide services to the local government. According to the document analysis and interviews findings, the primary objective of the networks interactions is to develop e-procurement application and enforce its implementation in a governmental organization by gathering information about the user's needs and situations. The local and global networks illustration summary can be seen in Figure 1 (see Appendix A).

In the global network, IGPP consists of policy and strategy development division, monitoring-evaluation and information system development division, human resources development division and law division, which collaborates to manage and develop the application. These divisions constantly collaborate and are in close contact with the EPSU in the local network to enhance coordination of implementation. IGPP also collaborates with donors and international organizations such as United States Agency for International Development (USAID), World Bank and Organisation for Economic Co-operation and Development (OECD) to develop the regulation and application of e-procurement (Yulianto, 2010). From 2007 until 2009 USAID through the Millennium Challenge Corporation-Indonesia Control of Corruption Project rewarded a grant for building the first five regional EPSU in five provinces in Indonesia. The grant provided hardware, software, internet access, and training of the application to the vendors and suppliers (Arifiyadi, 2010). IGPP also works closely with Ministry of Finance Republic of Indonesia (MoFRI) and National Planning and Development Agency (NPDA) to develop the application and manage the state budget and spending to maintain its efficiency and prevention of fraud.

IGPP consults organization policy and procurement issues with the Ministry of State Apparatus Utilisation and Bureaucracy Reform (MoSAU-BR), and experts and academicians to maintain the quality of services. Concerning e-procurement implementation, IGPP collaborates with suppliers, vendors, social community, Tax Offices, Law Offices and other organizations (*Bank, Insurance Companies, and Licensing Agencies) in communicating e-procurement process and also to generate data for e-procurement verification process. In the monitoring and evaluation, the National Oversight and Law Enforcement Agency (police, attorney, National Audit Agency, and court) developed a monitoring and e-audit application to enhance e-procurement transparency and accountability.

The collaborations and interactions within actors in the global network also occur in the monitoring and evaluation of the e-procurement. According to the interviews, IGPP periodically conducts meetings to gather feedback from users and related parties, and discuss further application development. Some of the feedbacks suggest that the application should also provide services for e-catalog, e-purchasing, e-contract management, e-payment, and e-budgeting which will be supported with interoperability data with the tax and legal offices which issue legal documents for e-procurement verification process.

"*E-procurement facilities and infrastructures have given significant impact in the distribution of e-procurement information throughout the Province and District.*"

(Verification Staff-EPSU)

From the explanation of actors and their relationships, we can see how the actors are shaped from the aims of the project and are embedded roles which determine the success of the project. The stabilization of the networks through the alignment of the actor's interest through translation (Callon 1986; Law, 1992; Latour, 1987) is aimed to prevent conflict of interest. IGPP encourages local government to be independent in managing the e-procurement application. However, according to the interviews, users still need close supervision and training to ensure compliance with the regulation. This implies that the collaboration of actants within and across networks in which obligatory point of passage becomes essential to mediate all interactions between actors in a

network and defines the action program. Regarding this project, the Obligatory Point of Passage (OPP) of project management, monitoring, and evaluation plays a crucial role to control transactions between the local and global network to determine the project success.

4.2 Translation and power

The collaboration of stakeholders is essential to develop the regulation and e-procurement application to accommodate the user needs. Figure 2 (Appendix B) summaries the concept of translation among the stakeholders, applied to the e-procurement implementation based on Callon and Law (1986). The development and management of e-procurement application take place in IGPP with the support of its divisions (IGPP, 2010a). The Policy and Strategy Development Division is responsible for formulating and developing strategy, policy, and regulations to establish government e-procurement. The Monitoring-Evaluation and Information System Development Division develops the e-procurement system based on the result of monitoring, evaluation, and feedback from the users. To manage and develop human resource competency in IGPP and EPSU, the Human Resource Development Division conduct professional development, training and certification for staffs. In case any cases and dispute in e-procurement, the Law Division will present opinions, advice, and recommendations to overcome the problems.

In this case, the translation process involves all entities which are enrolled into their identities and stabilized through project management, monitoring, and evaluation which control transactions between a local and global network (Callon, 1986). The translation process begins with problematization in which the actors explain the problematical situation to other actors in the network to align interest through interessement and make them convinced to accept the idea of the situation, thus enrolling them into power and identities, also mobilising the actors which stabilise the network through the obligatory point of passage (Latour, 2005; Callon, 1986). In this project, IGPP communicates the urgency of e-procurement to governmental organization.

IGPP conducts training and workshops for EPSU staff, vendors, suppliers, and governmental organization to manage and implement the application. Since 2006, e-procurement implementation growth has been significant in which 264 EPSU has been established in 32 provinces (IGPP, 2009c). Based on the interviews with the application developers and users it is exciting to find that there are some barriers in the implementation process regarding the acceptance of users, governmental organizations, e-literacy, digital divide, and mentality.

"The district's government did not agree to implement e-procurement because it was not compulsory. Since it is now regulated that e-procurement implementation is compulsory, they have started to build infrastructures and e-procurement facilities."
(Head of Technical Team-EPSU)

"As this e-procurement application is quite new, and because the public trust has been low, public trust in e-procurement application is also low."

(Application Developer-IGPP)

Based on the interview results, the reluctance of regional government head to enforce e-procurement inhibits the implementation and the human empowerment resource to use the application. Problems of digital divide and e-literacy require training and understanding the benefits of IT because most of the users still lack trust and have the mindset that IT is hard to implement and prone to failure. This situation enforced IGPP to increase training for governmental organizations and users to increase public awareness to deploy the application.

4.3 Delegation and Durability: the adoption of technology to enhance transparency and accountability for the e-procurement system

The role of human actors in the procurement process is delegated to technology through the development of e-procurement application which embeds social and organizational role starting from procurement registration until result announcement. The main aim was to create social durability and discipline by tying humans to moral laws (Latour, 1992) and prevent irregularities. The interview results explain the developer's views that the role of IT is significant to make information more accessible and transparent throughout the whole e-procurement process. In the manual

procurement system, access to information was complicated. Previously, the announcements can only be accessed in the formal offices for a limited of time and by limited of people. Since the manual procurement process involves submission of hard copy bidding documents, there is no guarantee of the credibility and reliability of the documents. Thus, it is prone to deviations and post biddings.

Using IT, documents are uploaded into the system, encrypted and are only allowed to be uploaded in the specified time, so it is difficult for the committee and participants to modify them. This e-procurement system also increases the independence of the procurement committee from the head of the institution and external parties, because sometimes there are pressures to pronounce a particular winner due to conflict of interest. The transparency of this system protects the procurement committee from such deviation.

"Any manipulation will be feasible and suspected by the public. This application minimizes face-to-face interaction between the committee and bidders. The data of the auction committee is not disclosed to prevent any threat and bribery."

(Lead Consultant-IGPP)

"The more transparent the information, it will draw more attention from the public to criticise and evaluate the e-procurement process which enables the process to be more countable and credible."

(Application Developer-IGPP)

We also interviewed the application users to gain their insights about the importance of IT in the e-procurement system. The users confirmed with the developers' insights on the importance of IT. Governmental organizations and application users argued that nowadays local government experience problems of having policies outside the formal regulations, thus monitoring must be increased to minimize regulation deviations.

"The implementation often does not correspond to the regulation because of a conflict of interest, human involvement, and policy intervention."

(Technical Staff-EPSU)

IGPP also developed document security and e-audit application to increase public trust, document security, privacy through increased transparency and accountability.

Transparency in e-government can be delivered through the proactive dissemination of government materials and protection of whistleblowers (Piotrowski, 2007 in Bertot et al., 2010; Shim and Eom, 2008). Enhanced transparency supported by the confidentiality of information and networks security facilitates the increase of public trust and government accountability to the citizens.

"...the features which support transparency and accountability are the access rights of system administrators, monitoring administrators, security of access, access rights of the system's management, and also feature of e-audit and document security application."

(Head of Technical Team-EPSU)

The interviews revealed that in the e-procurement system, every user has to register online to be given an ID and password. The vendors and suppliers wanting to participate in the procurement must submit required documents which will be verified to make sure its authenticity and the vendor's competency. Looking specifically into the applications, e-audit and document security application plays a significant role to ensure the credibility and reliability of information disclosed to the public. Data security application secures and encrypts documents submitted by the vendors, which are secured by password and can only be open by the procurement committees and other verified users. This degree of document security and transparency enable immediate identification of irregularities in the system, and also quick tracing of fraud. To support IT implementation, all EPSU personnel are certified, trained and officially employed to maintain their performance and integrity.

Further, the interviews also revealed that the e-audit help ensures accountability of e-procurement information, used explicitly by auditors to conduct an audit on the e-procurement process. Auditors have specified login ID and password which enable them to access necessary data for evaluation. Every process of e-procurement has its log which is automatically reported to the auditor's data summary. There is also an e-procurement reporting system disclosed on the website which shows the activities, the number of daily bids, number of tenders, and the total ceiling budget. This information can be monitored online so that the public can access information about the competency

and track record of vendors and suppliers, which enable internal and external monitoring.

4.4 *Barriers to transparency and accountability of the e-procurement system*

Despite the importance of the applications, the interviews also revealed the barriers of information transparency and accountability that has prevented the full utility of the application. As previously explained in the actor-network analysis, problems of e-literacy, a reluctance of implementation, and lack of leadership from the governmental organization have occurred. The document security application builds public trust, data privacy and security to enhance transparency. IGPP believe that the users view that technology is hard to implement which makes them reluctant to use this application. Thus, building trust through the transparency and accountability of the system will take the effort of training, and monitoring. From the developers' perspectives, there are no technical barriers which prevent the application implementation to enhance transparency and accountability, but more of problems concerning human resources competency, leadership, and willingness to put some efforts in the improvement.

The interviews results have also revealed problems in e-audit implementation. The developers view that the progress of e-audit implementation has been slow due to the transition process from the manual system and also problems in the human resource competency and infrastructure. Moreover, auditors lack understanding of the e-procurement process, and many of them are more convenient using the manual audit process.

"The problem is e-literacy of auditor because this application is new and they are not used to it, so we have to conduct training to change their working culture and mindset. "

(Application Developer-IGPP)

Further, the problem of a digital divide in many rural areas in Indonesia also creates reluctance for users to implement this application. Moreover, since e-procurement is not yet compulsory, users tend to delay the implementation because they doubt whether this application will be beneficial. Users also assume that technology will not bring much impact to improve the procurement process and can still be manipulated.

"The most difficult thing is a matter of public trust and the integrity of the system itself. E-literacy can be trained, but public trust is complicated to build. So we try to ensure that the committee conduct evaluation correctly and we help vendors to submit their documents to prevent an unnecessary problem that may cause further problems."

(Technical Staff-EPSU)

The interviews also revealed that if there are errors in the system, users have to report it to IGPP and it may take time to be solved because of the long waiting list in the repair service. Another problem is the lack of data interoperability and integration between the e-procurement application database with the institutions which issues legal documents required such as the tax office and law and attorney offices. Without interoperability, the verification process is complicated and has to be done manually and is more prone to the deviation. Based on the barriers to transparency and accountability in the application implementation, IGPP and EPSU have carried out efforts to solve the problems in human resources, infrastructure, and the reluctance of users. IGPP enforce the implementation through regulation and also carry out training to increase public awareness. EPSU also conduct free training every Wednesday and Thursday for vendors and also for auditors and procurement committees which are arranged by schedules. Table 1 (Appendix C) summarise the e-procurement developers and users insights about the role of IT and barriers to information transparency and accountability.

4.5 Discussions

Latour (1991) argued that society is made durable; nothing is purely technological or social, as society is held together by heterogeneous means of natural and technological factors. Based on the case study, we can infer that the success of technology implementation does not only depend on the technical infrastructures and machines in the application but also require the collaboration of competent and determined human actors to manage and support the technological roles in the organizations. The technology was delegated to substitute the role of human actors in the manual procurement process to prevent irregularities and fraud. Specifically, document security application and e-audit application were developed to increase

information transparency, accountability and integrity of the application to increase public trust. IGPP have expressed the problematical procurement situation (problematization) to governmental organizations, aligned actor's interest and translated them into roles to achieve the desired outcome of the project.

From the analysis, it is interesting to hear from the application developers and users that the main problems in the application implementation more relates to the organizational aspects of the users and staff such as lack of leadership to enforce implementation in the governmental organization, e-literacy, infrastructure and low level of public trust. These problems which are embedded in digital divide in developing countries (Bertot et al., 2010) must be tackled with the deployment of technology which provides access as well as training and engage users to participate in the application. Moreover, greater connections between users, empowerment of citizens to participate in e-procurement and collaboration to promote the culture of transparency will enhance the social benefits of transparency (Lin, 2001; Fukiyaa, 2001; Wellman, Hasse, Witte, and Hampton, 2001 in Bertot et al., 2010). The main concern was the lack of interoperability of the data in the e-audit and document security application with the institutions which issues required e-procurement supporting documents such as the tax office and law office. This condition prevents verification process efficiency because it still has to be done manually and prone to human error.

Another concern was about the lack of supporting the infrastructure of electricity and internet connection in the rural areas, which creates barriers in the spread of application throughout the nation. It is said stated that the larger and more established a country, it is better equipped with financial, technical, and personnel resources to support IT implementation, and also have a lower level of implementation resistance (Moon, 2002; Ebbers and van Dijk, 2007). Regarding the heterogeneous actors involved in this project, we can infer that there may be challenges in aligning the actors in the global and local network. For instance, the interviews have shown the lack of collaboration and restraint between actors in the global network, mostly the willingness of related parties to fully support the programme. Since these factors are fundamental in supporting e-procurement application, it required collaboration between global and

local network and increased awareness and alignment of interest between the developers and users to prevent conflicts and withdrawal of actors from the network will create obstacles.

Despite that the role of human actors in the manual procurement process was delegated into technology, the combination of organizational aspects and technical aspects remain crucial in the achievement of the goals. We can see that the application may not have hitches, but the implementation will struggle without the support of management and users' competency, leadership and trust. It is beyond this research aims to determine the success of the e-procurement implementation, but based on the analysis, we conclude that social and technical aspects are interrelated and empower each other in the collaboration to support e-procurement in enhancing information transparency and accountability. E-audit and document security application were developed to deliver transparency and accountability functions, but its full utilization requires the support of infrastructures and personnel capability and integrity to implement them to achieve desired outcomes. Lack of collaboration between human and non-human actors will create barriers to reach the desired outcome of technology delegation.

5. Conclusion, Contribution, and Limitation

This research identified the actors and networks involved in Indonesian e-procurement which assisted in studying the role and barriers of information technology to enhance information transparency and accountability. The data were obtained from six interviews with e-procurement application developers and users and also supported by documentary data. Briefly explained, human and policy intervention and different perceptions on the role of technology between developers and users create obstacles in the application development and implementation, barriers to information transparency and accountability. In the translation process on e-procurement application, the lack of leadership from governmental organizations, reluctance to implementation, e-literacy of users, lack of infrastructures and lack of public trust create obstacles in the alignment of the actors' interest and enrolment into the project to implement the application. The

role of information technology specifically the e-audit and document security application become crucial in preventing fraud and maintaining the independence of procurement committees, also enhance transparency and accountability. The users and developers were overall satisfied with the e-procurement application and emphasized more in the obstacles of governmental organization leadership, users' e-literacy, lack of public trust, lack of interoperability of data, and lack of infrastructures. What must be focused on are the social factors of user's acceptance, user's literacy, sufficient infrastructure, trust and leadership which are the foundations of the application's success. This confirms previous research by Jaeger and Matteson (2009), Heeks (2005), Steib and Navarro (2006) and Bertot et al. (2010) that social determinants of users' acceptance, culture, e-literacy, and trust determine the success of technology implementation.

This research aims to contribute to the organization, work, and technology field, as well as in good governance and accounting, to provide insights which will be beneficial for the government to create an efficient, transparent and accountable e-procurement system. Due to the limitation of this research, there are some suggestions for further works. First, further research should also explore other IT reforms in the Indonesia ICT Flagship Programme such as e-education, and e-budgeting. Secondly, transparency and accountability are only two principles of good governance which are the base of the e-government reform. Further research should also study the extent of other governance factors related to IT implementation. To make the case study analysis more productive and more profound, observations should be done to gather more data to support the interviews and analysis of documentary data. Moreover, a broader scope of research, which involves other actors such as donors, experts, academicians, and suppliers, will present richer findings to compare and contrast different insights on a particular IT implementation programme.

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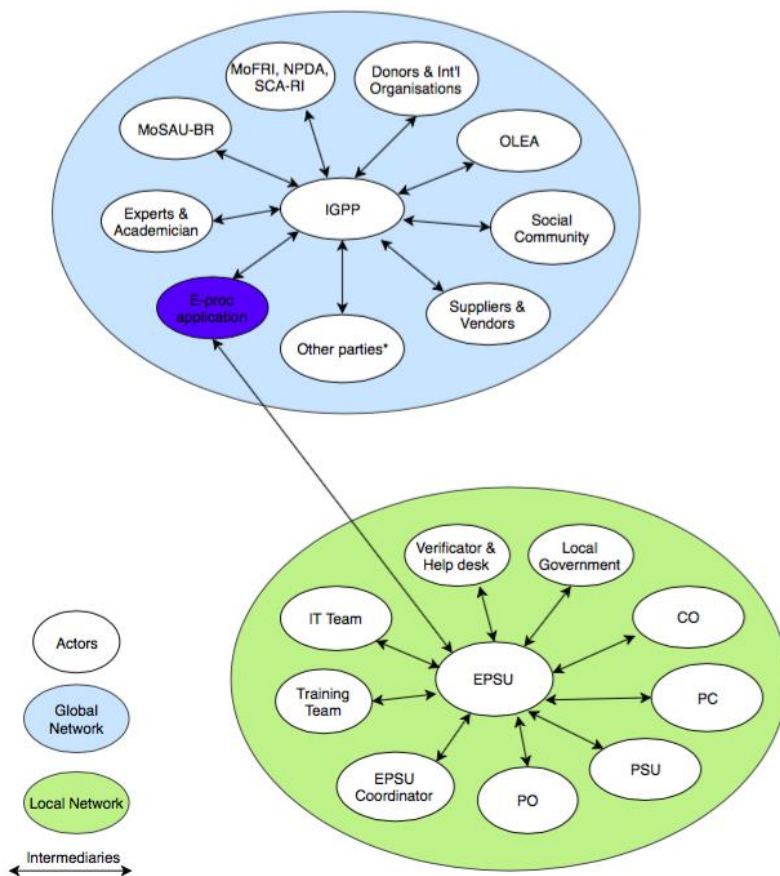
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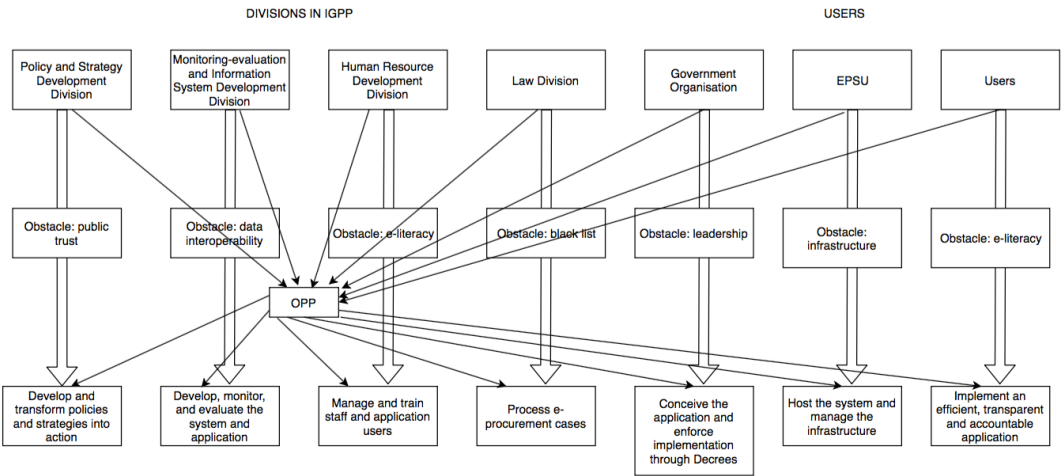
Appendix

Appendix A – Figure 1. Global and Local Network of Indonesian E-procurement

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Appendix B - Figure 2. Translation within Indonesian E-procurement Implementation

Appendix C - Table 1. Summary of The Roles and Barriers of Information Technology to Increase Transparency and Accountability

Insights	Roles of Technology	Barriers of Technology
Developers	• Increase access and transparency throughout the r-procurement process • Encryption f documents to prevent fraud and post-bidding • Increase public monitoring • Increase independence of procurement committees • Online reporting and monitoring system	• E-literacy • Reluctance to implement the application • Low public trust • Lack of human resource (staff) competency • Lack of leadership • Slow e-audit implementation progress sue to e-literacy
Users	• Increase connectivity between areas • Increase business opportunities • Increase discipline and monitoring • Prevent deviation • Secure registration process • E-audit application • Document security application	• Digital divide • User skepticism about technology • Connectivity and electricity problem • Lack of data interoperability of the application