DEVELOPING E-PROCUREMENT SYSTEMS: A CASE STUDY ON THE GOVERNMENT E-PROCUREMENT SYSTEMS IN KOREA

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Abstract

Korea launched national e-procurement systems in September 30, 2002. The adoption of the e-procurement systems in the central government of Korea has been acknowledged as successful. This paper presents a case study describing the public e-procurement systems of Korea, analyzing the development process, and finding factors for successful adoption of the systems. Government e-Procurement Systems (GePS) is a portal site providing information on public procurement and an application service provider of public procurement. GePS advances procurement service by reducing paper work and red tape, expanding the range of commodity selection, and standardizing services. Government-wide support including the President had a crucial role for the adoption of GePS. High capacity of information technology and institutional collaboration among public agencies were other foundations for the successful establishment of GePS.

I. Introduction

Electronic procurement (e-procurement) has become more significant in public and private organizations. People expect that electronic transactions between organizations will soon dominate. However, development and implementation of e-procurement

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systems in organizations, especially in governments, is much more difficult than typically discussed in brochures and pamphlets. As well, it is not easy to find good examples of e-procurement systems in governments because national e-procurement systems in many countries have not been successfully developed. This paper presents a case study of the public e-procurement systems of Korea by describing the central government's e-procurement systems and by analyzing the development process and finding factors for its successful adoption.

E-procurement systems work for exchanging documents, opening bids and contracting, shopping electronically, paying electronically, and sharing information on goods & services as well as participants. Whereas business-to-business e-commerce has prospered, e-procurement by government or government-to-business (G2B) has not progressed as much. Advantage System (e-procurement systems) of United States General Service Administration has been assessed as "limited success" and has been recommended to develop a "comprehensive business strategy" by General Accounting Office (GAO, 2003). Integrated Acquisition Environment of the U.S. – the federal government's procurement e-procurement initiative anticipates creating a single web-based portal site (Drabkin and Thai, 2003). A number of states in the U.S. are reported as successful cases of e-procurement. Commonwealth of Virginia's *eVA* has been identified as a good e-procurement system.[1] Yet, it is very hard to find good models of e-procurement at the national or federal level. A report on Chilean e-procurement systems, ChileCompra, shows the disappointing results of systems development and agencies' usage in recent years (ChileCompra, 2002).

However, the e-procurement systems in Korea have been acknowledged as successful. Public Procurement Service of Korea (PPS, http://www.pps.go.kr) launched the Government electronic Procurement Systems (GePS, http://www.g2b.go.kr) on September 30, 2002. GePS is e-procurement systems "aiming to establish a nationwide web-based procurement system, dealing with the whole procurement process, including acquisition of all information on the national procurement projects, procurement requests, bids, contracting, and payment for 27,000 public organizations and 90,000 private firms" (PPS, 2002; p. 2). Most public organizations in Korea, from central and local government agencies to public enterprises, can purchase and contract through GePS. They just need a personal

computer connected through the Internet. Since PPS began to develop its e-procurement systems, it has received attention by many organizations, international and non-government. The United Nations (UN) Division for Public Economics and Public Administration announced that PPS is a winner of the United Nations Public Service Awards 2002. According to the UN, PPS has reorganized procurement service by converting to e-commerce and is expected to save $ 2.8 billion every year. Other international organizations including the World Bank show their interest in GePS because the system is expected to save costs and to increase transparency of government purchasing and contract processing. PPS' effort of reforming and of developing the e-procurement systems has received awards from other Korean government agencies.[2] The most recent report of Organization for Economic Co-operation and Development (OECD, 2004) evaluated that GePS has a "strong pull-through effect on information and communications technology use in the private sector" and "no further action required".

This case study concentrates on the development and implementation of e-procurement systems in a country. The research problems, provided in the following paragraphs, guide this case study. Section II starts to introduce the e-procurement systems – GePS, which is developed and implemented by PPS. The functions and contents of GePS will be presented. Section III shows how GePS has been developed. This section explains how the information technology (IT) innovation has been adopted in public procurement management. Also, this part includes strategic issues for developing e-procurement systems such as initiation of system development, funding, regulation change and implementation. Section IV finds factors for successful adoption of e-procurement systems. This study does not focus on measuring performance of e-procurement systems because the impact of the new system is hardly evaluated in a short period. This case study analyzes literature including government documents and data of public procurement in Korea, mostly from PPS. For this study, one of the coauthors provides information from his participation on e-procurement system development in Korea. This paper will be helpful for governments considering the adoption of e-procurement systems or coping with problems of development and implementation of e-procurement systems.

Like other public management reform, adopting advanced IT in the public procurement process faces many problems, theoretically

and practically. Among problems, the first one is about figuring out what is e-procurement: conceptually e-procurement is somewhat hazy. There can be different forms of e-procurement depending on definitions. One simple definition of e-procurement is "the process of *electronically* purchasing the goods and services needed for an organization's operation" (Mitchell, 2001). The most general definition that the working group of the World Bank on electronic government procurement (e-GP) suggested is "the use of Information & Communications Technology by governments in conducting their procurement relationships with suppliers for the acquisition of goods, works, and consultancy services required by the public sector"(World Bank, 2003). Any definition on e-procurement suggests 'paradigm shift' of procurement systems from paper-based business to electronic- based (National Electronic Commerce Coordination Council (NECCC), 2000 a). The system development of information technology including e-procurement has changed rapidly since its onset. The evolutionary development of e-procurement systems presents difficulty in the adoption of e-procurement systems because a government cannot easily select a certain form of e-procurement among a diverse range of systems with different structure and functions. The various functions of e-procurement systems, from the simple – passive bid solicitation systems, to the advanced – catalog systems with integration to the accounting systems have been developed (NECCC, 2000 b).

E-procurement systems have diverse types. Some systems are mainly designed for providing information on the website rather than dealing with transactions. Other systems adopt e-shopping modules with electronic catalogs to supply goods and services that are based on pre-determined prices and qualities. Talero (2001) specified components of "fully developed" electronic government procurement systems. The first component is information and registration, full disclosure of every procurement opportunity and contract awards of public agencies as well as performance indicators. The second one is e-purchasing systems, embracing the acquisition of high-volume standardized goods and services with e-shopping or e-auction. The last component is e-tendering systems to manage acquisition process of specialized and large public projects, which requires heavily documented and regulated processes and careful evaluation. In e-procurement systems, e-tendering has more phases – registering, opening a bid, contracting, documenting, tracking whereas e-purchasing is based on the transaction modules, which are rather

compact processes, like e-catalogues (World Bank, 2003). Experts on procurement systems have paid more attention to tendering methods because it deals mostly with high value and low volume goods and services – *blue collar MRO*, which is believed more important (Neef, 2001; p. 26). And, purchasing processes, which are mostly managed by the central purchasing agency with its discretion, need more regulations and segments like tendering processes. E-procurement systems of countries will differ based on the development level of the systems as well as the demands of the public procurement systems of the country. Thus, this case study finds features of GePS by examining how advanced the e-procurement systems of Korea are.

Second, technology is not everything for e-procurement system development. The recent survey on state governments in the U.S. shows e-procurement of states is "in the experimental status" (Moon, 2002). The technical development of e-commerce would lead a government to adopt a highly-advanced e-procurement system. However, the new paradigm of public procurement, e-procurement, is a managerial innovation of government. It is not only technical adoption but also organizational change – from face-to-face transaction to electronic transaction. This change needs institutional settings including political support with leadership, sustainable funding, and legal amendments and managerial innovation.

Strategy for adopting a new system does matter. The significant advantage of adopting e-procurement systems cannot be denied – economic cost-savings, quality improvement of purchases and contracts, etc. However, those positive impacts can be increased by a better adoption strategy. The once promising e-procurement system development in Chile (Orrego, 2000) has not succeeded in launching with disappointing results (ChileCompra, 2002). The survey on e-procurement of state governments recognized many are facing challenges of technique, finance, law and management (Moon, 2002). The World Bank details government leadership, policy & legal framework, institutional change, human resources, and technology as critical success factors of e-GP (World Bank, 2003). From initiating system development to operating e-procurement systems, a government needs to have a strategic approach to address challenges such as funding the e-procurement development project. Therefore this paper explains how GePS has been developed and finds factors for successful adoption.

Third, the performance of e-procurement systems has to be considered. The impact of e-procurement systems includes economic efficiency as well as improved procurement capacity of the government. Especially in developing countries and mid-income countries like Korea, the electronic transaction will reduce the possibility of corruption that usually occurs with face-to-face transactions. It is not be easy to comprehend and measure the performance and benefits of e-procurement. Eakin (2002) categorizes the benefits into transaction, compliance, management information, price, and payment and showed a way to measure them. NECCC (2001) analyzes components of benefits and costs, tangible and intangible. The council's report argues the necessity of a return of investment (ROI) analysis based on benefits and costs and advises that one difficulty of this type of analysis is due to intangible and hypothetical benefits. This paper does not include performance measurement of e-procurement systems though some data on usage are provided.

II. Public e-Procurement in Korea

The public procurement systems of Korea are generally centralized and PPS is the centralized procurement agency. In spite of centralization, several procurement agencies take care of their own businesses. An agency in the Ministry of Defense (MOD) deals with military procurement. The total amount of public procurement in Korea was up to 58.2 billion dollars in 2002, 30 % of which was dealt with by PPS (PPS, 2003). All government agencies and local governments are required to use the service of PPS, if the prices of goods, services, and construction works exceed certain amounts and other public institutions, including a government-invested company can also request procurement services from PPS.[3]

Since the late 1990s, PPS has initiated the management reform. According to its annual report (PPS, 2003), PPS acknowledged 180 reform tasks of procurement services in 1999, and completed 152 tasks by the end of August 2000. Prior to these management reforms, PPS had already begun to digitalize procurement processes based on Electronic Data Interchange (EDI) since 1997. The first development was applied to the procurement of domestic goods in 1997 and then PPS expanded electronic systems to other services and adapted procurement services with e-tendering

and e-payment. These movements of building e-procurement systems were finished in 2001 but these PPS' efforts were limited within the agency itself. After Korean government recognized the benefit of e-procurement system would not be limited in one agency, the efforts were augmented to build government-wide e-procurement systems.

As strategic plans of e-procurement systems guide the system development, PPS profiled strategic plans for e-procurement system development with business process reengineering. The strategic plan encompassed visions and goals of e-procurement systems. The Information Strategic Plan (ISP) made in January, 2002 indicated PPS would make efforts to promote transparency and efficiency of the public procurement services by providing a single window of public procurement, making every procurement service available on the Internet, and redesigning and streamlining previously paper-based and complicated procurement processes.

1. Major Functions and Structure of GePS

GePS is a portal site providing information on public procurement and an application service provider (ASP) for e-procurement. PPS selected 'the independent portal model'. Rather than focusing on the buyer side or the vendor side, GePS is a public e-marketplace, "where multiple buyers and sellers can meet electronically and transact all types of business through a single point of integration" (Neef, 2001; p. 80). Main services of GePS cover i) helping public organization's self-procurement with contract request, bid, contract, payment request and follow-up management such as inspection of supplies; ii) managing e-shopping mall for PPS' supply of contracted products with unit price contracts and office supplies and for public organization's unit price contracted supplies; iii) sending procurement requests from public organizations to PPS on domestic and foreign supplies, services, and works; iv) providing information on companies regarding to business ID certificate, national tax payment certificate, qualification including debarment or suspension of suppliers; v) reporting performance results of contract; and vi) issuing various notices related to procurement (PPS, 2003). GePS is a fully developed e-procurement system that is composed of information and registration systems, e-purchasing systems, and e-tendering systems. Though GePS has not been integrated with other public financial management systems including accounting systems, GePS is linked with government financial management and

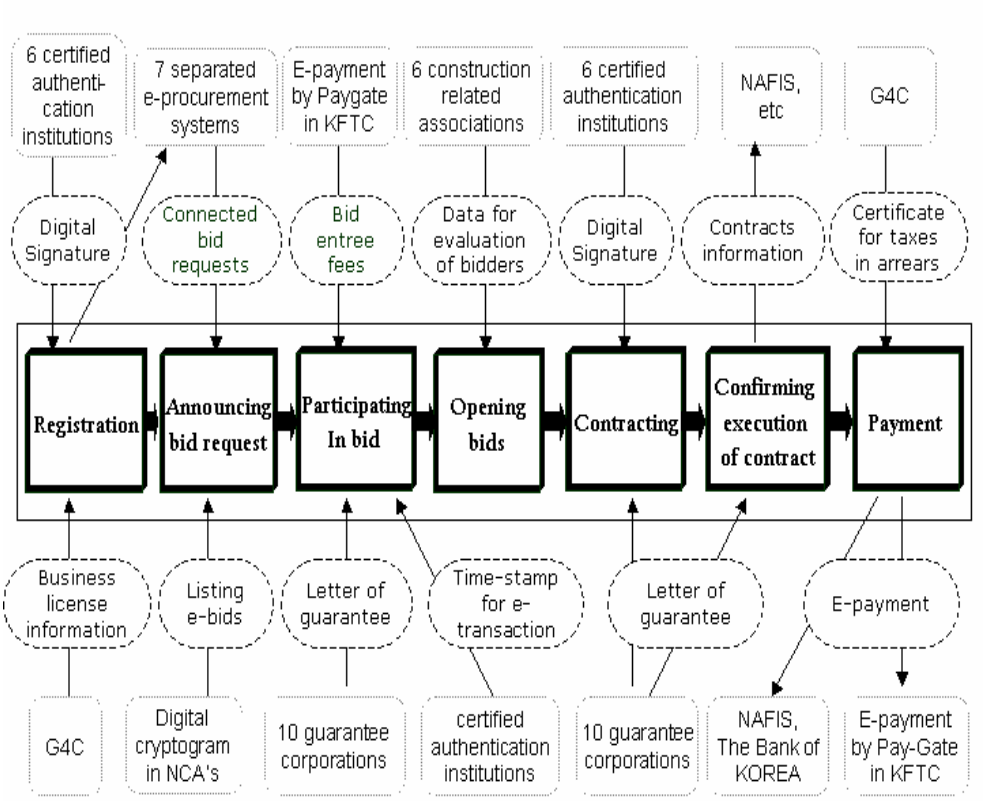
information systems through one-stop services. GePS presents information services on public procurement of public agencies and registration services for vendors and public agencies by linking internal and external systems. PPS established e-shopping mall for e-purchasing in GePS and digitalized tendering processes that are applicable to most procurement services.

GePS is a network system that connects public agencies and vendors. This network system is constructed with 53 external systems that are managed by outside institutions. The Government for Citizen (G4C) Systems from the Ministry of Government Administration and Home Affairs provides tax records and necessary information for registration. The National Finance Information Systems (NAFIS) provides real-time information on finances of government agencies. Six construction-related associations are connected for obtaining information on contract bidders; ten guarantee corporations are involved for receiving contract deposit; six certified authentication institutions help to verify the digital signature; the Korea Financial Telecommunications & Clearings Institute provides services for e-payment with fifteen commercial banks; and the National Computerization Agency (NCA) issues the public key infrastructure for e-bid cryptogram.

The general workflow of e-procurement through GePS is described in Figure 1, though procuring processes differ slightly, depending on the object to procure – goods, services or facilities. After registration with certifications, public agencies and vendors can open bids and participate in any kind of procurement processes. One major feature of GePS is electronic bidding. The initial step for participating in bidding is to register in GePS. PPS approves the registration of bidders through GePS by verifying the information through external systems such as business license information. Then, the digital signature is issued for the bidders from the certified authentication institutions. When a bidder finds an appropriate bid announcement that is made by public agencies through GePS, the bidder logs on to join in the bidding process. A bidder offers a price through GePS and the process is as simple as sending an email. All necessary information including performance evaluation on the bidder is available in GePS and the public agency of bid request makes the contract through GePS. After delivering goods and services by the due time, the public agency issues the receipt through GePS for confirming the execution of the contract. The e-

procurement process ends by paying the bidder through e-payment systems.

Figure 1.
Workflow of E-bidding and Links with Other Systems



2. Improvement of Procurement Processes through GePS

Since the launch of GePS, the procurement service has been mostly delivered through GePS. The data from PPS shows the contribution of e-procurement in procurement services.[4] For one fiscal year – from January 2003 to December 2003, GePS took charge of most public procurement services. Total amount of procurement through GePS is up to 31.6 billion dollars. E-bid has accounted for up to 92% of all biddings. As Table 1 shows, 99,020 notices of e-bid were electronically placed on GePS. 15.4 million participants have been involved in e-biddings and 17.2 billion dollars has been transacted

through e-bidding systems of GePS.

Table 1.
E-bid in GePS (FY 2003)

	Biddings (cases)	Participants (thousands)	Transactions (million $)
Total	99,020	15,404	17,190
Monthly	8,252	1,284	1,433
Daily	330	51	57

Table 2 indicates that 98% of orders from public agencies have been made at the e-shopping mall for the pre-contracted items in GePS. Only 2% of orders were based on paperwork. The rate of electronic orders has considerably increased after launching GePS - from 81% in 2002 to 98% in 2003. On average, 15 million dollars has been ordered a day through the e-shopping mall of GePS.

Table 2.
E-shopping Mall in GePS (FY 2003)

	Orders (cases)			Transactions (million $)		
	Total (A)	GePS Shopping Mall (B)	Ratio (B/A, %)	Total (A)	GePS Shopping Mall (B)	Ratio (B/A, %)
Total	462,274	454,831	98.4	4,474	4,367	97.6
Monthly	38,523	37,903	-	373	364	-
Daily	1,541	1,516	-	15	15	-

As of December 2003, 25,529 public organizations with 39,885 users and 92,042 private firms with 116,681 users have participated in the new procurement systems. The public organization users include 3,728 central government agencies, 5,535 local government agencies, 9,396 schools from elementary schools to universities, and another 6,870 public enterprises.[5] According to the Internet evaluation institution in Korea, GePS is the best government website in terms of visit frequency, page view, and the length of stay per each user during the first half of 2003 (Metrix Corporation, 2003).

Beyond the increased number of users of GePS, it is worth noticing the change of procurement management. First, GePS altered

activities of searching and gathering information on public procurement. For the better management of government purchasing and contracting, information is crucial. More and better quality information helps to provide better goods and services to public organizations. Paper-based procurement systems require red-tape activities – regulating and controlling, which causes more administrative and transaction costs. GePS is a single window for the public procurement, which has integrated information systems. The amended procurement law requires most public agencies, even the procurement agency at MOD, to list bid notices on GePS. Announcement bids on the gazettes, newspapers, or bulletin boards will become history in Korea. The entire bidding information can now be checked on GePS, which helps suppliers by getting more information through GePS, once they register.

Second, lots of paperwork has been reduced by simplifying and digitalizing the procurement processes. GePS helps PPS to remove many unnecessary document submissions from vendors and public agencies. In the previous procurement systems, vendors had to provide many documents like business registration certificate, full tax payment certificate, etc. With current GePS, a company, once registered, doesn't need to submit documents because networked database systems share all necessary information. For instance, construction companies' performance information on previous contracts is provided to the public agency that announced the bid request of the construction works. In addition, e-payment systems have been adopted in GePS and vendors can request public agencies to inspect goods and to pay for them at the almost same time of delivery of goods. As a result, the payment time has been reduced to take as fast as four hours after a supplier made the payment request.

Third, the quality of public procurement has been improved in terms of expanded ranges of commodity selection. The e-shopping mall in GePS helps public organizations to select and to purchase necessary commodities with e-catalogue. The e-shopping mall has two catalogues. One is the mall of goods that PPS has pre-contracted at the unit price. The other mall is for commercial goods that companies list directly. Public agencies can purchase from either mall and, therefore, have more choices for their purchases.

Last, PPS increased the rate of standardization in procurement services. PPS changed the commodity classification

system with the United Nations Standard Products and Services Code (UNSPSC), which is recommended for e-commerce. The work of standardization of the coding systems has led to reduce the problem of duplicated coding systems in PPS because PPS previously had different coding systems for its own. This classification system is compatible with companies since PPS agreed with private sector representatives to unify classification systems into UNSPSC. As a result, commodities can now be registered and searched promptly and the information can be easily exchanged between the public and private sector.

3. Technical Solutions in GePS

The significance of technical solutions in e-procurement systems should not be neglected. This part accounts for technical solutions of GePS regarding to standardized exchange and security. First, GePS had adopted advanced standard solutions for exchanging documents since 1997. The elementary e-procurement systems had taken advantage of Electronic Data Interchange (EDI) for electronic transmission of business data. Since the development of Extensible Markup Language (XML) in the mid-1990s, e-procurement systems have simple and affordable solutions for secure exchange of transactional business data (Neef, 2001; pp. 100 – 106). GePS develops electronic documents based on XML Schema from World Wide Web Consortium (W3C) as well as the Core Component method from Electronic Business Extensible Markup Language (ebXML). Simple Object Access Protocol (SOAP) of the Microsoft and ebXML Message Service Specification (MSS) are used for messaging, which are world wide standards also. In addition, GePS employs standardized documents for electronic transactions and the documents are shared among public agencies. PPS developed 166 electronic documents for operating GePS. Among them, 15 documents, frequently used, have been registered as standard e-documents in the field of e-procurement at the Korea Institute for Electronic Commerce in August 2003. Every participant of public e-procurement shares these documents in Korea. PPS has also taken part in the United Nations Center for Trade Facilitation and Electronic Business (UNCEFACT) for making the global standard of ebXML documents.

Security is one of the critical issues in electronic transactions. GePS adopts the Public Key Infrastructure (PKI) security and encryption techniques, and employs digital certificates from the

licensed certification authorities. Digital signature on each electronic document has been required and encryption on documents must be kept secret. GePS also provides Time Stamp Service and Personal Identification Service, which are supported by licensed certification authorities. Also, the government encouraged technical development of e-commerce by legislating and revising laws, which include the Digital Signature Act (enacted on February, 1999), the Act of Framework on E-Commerce (enacted on February, 1999) and the Electronic Promotion Act on Administration Processes for the Establishment of an e-Government (enacted on March, 2001).

III. Developing GePS in Korea

This section explains how the public e-procurement systems of Korea have been developed. The details include initiating the e-procurement project, building e-procurement systems, funding for system development and other issues for carrying out GePS.

1. Initiating e-Procurement Project in the Government

The development of GePS was initiated as a national project of e-government policy and a part of national IT policy. Policies on IT in Korea stem from the 1st and the 2nd Computerization Projects of the Government Administration from 1978 to 1986 and the 1st and the 2nd National Backbone Computer Network Project from 1987 to 1996. The recent government policies are introduced in the Master Plan for Informatization Promotion from 1996 to 2000, and 'Cyber Korea 21' from 1999 to 2002 (NCA, 2003). Korean government's effort to build e-government has been more steady and continuous since the beginning of Cyber Korea 21 of 1999. Thereafter, public agencies adopted IT to make administrative processes more efficient and productive and chief information officers were appointed in the government. To accelerate e-Government projects, the 'Electronic Promotion Act on Administration Processes for the Establishment of an e-Government' was enacted in 2001 and the Special Committee for e-Government was established in 2001, which is a joint civilian-government committee within the supervision of the Presidential Commission on Government Innovation (PCGI). IT experts from the private sector and vice ministers from the ministries are members of the committee. The Special Committee for e-Government selected 11 e-Government projects, which the project of GePS development belongs to (Special

Committee for e-Government, 2003 a).[6] PPS already started to digitalize procurement services by adopting EDI and e-bidding solutions in the late 1990s based on its own plan. The benefit of GePS is expected to cross over all public agencies and even the private sector. That is the reason the special committee selected GePS as a major project for e-government. Without initiation and supports from the special committee, it might be hard and take longer to develop GePS.

Prior to developing GePS, PPS had launched several independent projects for digitalizing procurement services. With procurement service reform of reducing paperwork and streamlining processes, PPS got more accustomed to IT solutions. PPS became the first among public agencies to adopt the electronic bidding systems in November 2000. However, in spite of progress, PPS found it needed a comprehensive approach such as building portal services to providing information on public procurement. Procurement experts counseled on the inefficiency of public agencies' management of their own suppliers' list and repeated tasks and tenders' waste of gathering information on procurement and cost of submitting lots of documents. These reasons urged the Special Committee for e-Government and PPS to reach the agreement to design GePS.

2. Building e-Procurement Systems

The special committee asked e-government projects to conduct business process reengineering (BPR) for promoting the use of IT. For the BPR of GePS, three government ministries were involved – the Ministry of Planning and Budgeting (MPB), the Ministry of Information and Communication (MIC), and PPS. MPB is the government reform initiator and MIC is the ministry of IT. BPR was assisted by a private IT consulting firm, the Samsung SDS, from July 2001 to January 2002. BPR generated the Information Strategic Plan (ISP) adopting e-procurement systems in PPS. The BPR/ISP report contained the strategy for building e-procurement systems, the result of procurement service innovation, standardization of documents and catalog, e-procurement system plans, and recommendations on legislation for e-procurement. At that time, the task force estimated economic benefit as 2.8 billion dollars annually.[7]

From February 2002, PPS managed the development by selecting private IT firms for constructing systems. After the request

for purpose process, PPS made a contract with the Samsung SDS as the system developer of GePS in March 2002. The first step of development was to analyze the needs of users in the public procurement systems. PPS and the Samsung SDS conducted the research on the needs for public e-procurement with the support of other public agencies and private firms from April to May 2002. After the first step, PPS asked the Samsung SDS for program development and architecture design. The technical development had been done from June to July 2002. Most work of system development was to customize e-procurement software for PPS. In August 2002, PPS finished the internal tests for operation and training. At last, GePS was launched in September 30, 2002 but the work of building GePS was completed in December 2002. For this project, PPS organized a task force, composed of representatives from sixty agencies – public agencies and suppliers. The work of developing e-procurement systems in PPS was done not in-house but by the contract with the private IT firm, which had participated in the development of the e-bidding systems and e-shopping mall as well as the BPR project of PPS since 1997. The private firm had increased its familiarity with public procurement systems since the beginning of the project, and maintained its role as a system developer, which helps PPS to accomplish the adoption of e-procurement systems in the comparatively short period.

3. Funding for GePS

The cost of developing GePS was about 22.4 million dollars, 1 million dollars for BPR and 21.4 million dollars for building the system. One important issue on building new systems is how to fund for the project. PPS is a relatively small ministry in Korea, which is operated with special account of procurement. The fiscal year 2002 budget of PPS is about 95 million dollars whereas the fiscal year 2002 budget of the central government's general account is 65 billion dollars. Most revenue in special account of procurement is generated from procurement commission, which is 75 million dollars (PPS, 2003).

PPS has a special proprietary fund structure that generates its own revenue and executes its budget, separated from central government revenue and expenditure structures.[8] The special account of procurement is independently operated for ordinary procurement services and special projects such as procurement

service reform projects. The Special Committee for e-Government comprehended that e-procurement project's benefits are government wide and the development should be funded by a special fund – the Informatization Promotion Fund (IPF), which is based on the Framework Act on Informatization Promotion of 1996. IPF aims to assist IT research and development projects in the private sector with loan programs and to support IT projects of government with stable funds. The total amount of IPF raised by the end of the fiscal year 2000 was about 2.3 billion dollars and about 2 billion dollars were spent during the fiscal year 2002.[9] Most of the IPF is formed by contributions of major communication businesses and capital finance transferred from the government budget. The fund operation of IPF for e-government projects is managed by MIC and NCA.

For 11 projects of the Special Committee for e-Government, IPF gave support of approximately 144 million dollars, which is more than 65% of the total cost of e-government projects in the fiscal years of 2001 and 2002. All expenses for development of GePS were financed from IPF (Special Committee for e-Government, 2003 b). Prior PPS' IT projects were funded by the transfer to special account of procurement from the general account of the central government. The special committee, MPB, MIC and NCA concluded that the development of GePS should be funded by IPF rather than PPS alone because the project was expected to have government-wide benefits.

However, the maintenance of GePS is funded by the special account of procurement. The maintenance cost is estimated at 2.4 million dollars a year. The cost is mainly allotted to wages for outsourced programmers and counselors in the call center. The wages consist of 34 programmers and 34 counselors with 17 people from PPS. They assist to manage and to operate the programs and the hardware of GePS.

4. Issues on Implementing GePS

With developing e-procurement systems, governments need to consider some institutional settings for successful implementation – increased number of participants and electronic transactions. One important strategy for implementing e-procurement systems in government is how to institute legal and accountability mechanisms (Moon, 2002). For increasing the number of transactions through e-procurement systems and preventing abusive and fraudulent

transactions, laws and regulations on public procurement should be revised.

PPS in Korea initiated the revision of procurement laws, expanded the opportunity of training for using GePS and opened channels to receive feedback from GePS participants. On designing GePS, the result of BPR found that procurement laws and regulations needed to be revised for e-procurement systems. The Ministry of Finance and Economy and the Ministry of Government and Home Affairs supported the revision of four acts on public procurement including the Act Relating to Contracts to Which the State is a Party and related enforcement decrees and enforcement rules. The most significant change is that procurement law requires most public agencies to account for bids through GePS. This requirement is applied to other procurement agencies that have their own e-procurement systems, like the agency at MOD. As a result, most information on public purchase and contract is gathered on GePS and the number of participants in public procurement on GePS has been increased.

PPS outsourced the call center that has counselors. They are responsible for training public procurement officers and suppliers to use GePS. Also, participants' opinions and suggestions on GePS have been gathered through the call center. The center resolved more than 350,000 requests of users via phone call, email, and the Internet for one year.[10]

IV. Factors of Successful Adoption of e-Procurement Systems

This section analyzes the whole process of PPS' adoption of e-procurement systems in order to find significant factors of successful development. The factors include the President's leadership on e-government and interest in GePS; national capacity of IT to support the development of GePS; and organizational coordination and support for GePS. In addition to these factors, other aspects of development are included. As OECD (1998) indicated, the budget pressure is a significant factor for e-government projects. Korean government has relatively stable funding resources, IPF, for e-government projects including GePS, as mentioned previously in the part on development. The secured funding is another factor for

successful adoption.

1. Leadership and Interest of the President

The most important factor for successful adoption of GePS would be the strong support from the President. The 15th President (1998 – 2003), Kim Dae Jung, constantly expressed his special interest in e-government. In his inauguration address, he acknowledged the era of information technology and suggested venture capital as a key to overcome economic crisis. During the very early period of his term he showed his strong charismatic leadership. The economic crisis since 1997 urged reform of the economy with several programs – the financial systems, the Chaebul's governance, labor market and the public sector.[11] The Korean economy needed revolutionary transition to the high-value-added industry – knowledge based and IT industry. The crisis was followed by companies' work-out and tremendous lay-offs. Public finance in this period focused on reforming the Korean economy by expanding expenditures of public work projects and supporting new businesses. In 1999, the projects were most likely financial aids for the unemployed, but since 2000 government spent on public works of informatization projects such as building database of public information.[12] The Administration of Kim Dae Jung found IT industry would be a stepping stone for economic boom and encouraged the investment on IT industry.

Urgent needs for reform and strong leadership affected the successful adoption of GePS. IT industry in Korea proliferated though the whole economy struggled. In addition, the external and internal demands for government reform forced the President to support e-government projects. Responding to civil movement organizations and foreign investors, the administration launched several government reform programs – downsizing, privatizing, reengineering, and digitalizing. The reform programs were carried out by the Presidential Commission on Government Innovation (PCGI), established in 2000. Under PCGI, the Special Committee for e-Government was instituted in January 2001. In these periods, e-government projects were main parts of government reform programs in Korea. The Kim Dae Jung Administration presented Cyber Korea 21 as a comprehensive plan for informatizing Korea and President Kim expressed his firm interest in e-government programs, especially GePS. In February 2001, at the presidential

meeting for introducing annual plans of MIC, the President asked about e-commerce and e-procurement systems of PPS and MOD. In April 16, 2001, when MPB reported the annual plans, the President pointed out GePS as a core project of e-government. Without strong support from the President, the development of e-procurement systems could have been delayed for a while.

The priority of informatization projects and e-government programs could be verified with the budget. The budget changes during the fiscal years 1999, 2000 and 2001 show governmental priority to the informatization projects. Whereas annual change rates of total budget are around 10 % in FY 2000 and FY 2001, the budget of informatization projects and e-government projects increased much faster in these periods, as seen Table 3.

Table 3.
Informatization Budget and Budget Change Rates

	Fiscal Year	1998	1999	2000	2001	2002	2003
E-government projects[1]	Budget[3]	260.8	316.4	389.3	490.2	571.6	559.1
	Change (%)		21.3	23.0	25.9	16.6	-2.2
Informatization projects[1]	Budget[3]	715.1	856.3	1215.5	1502.9	1611.4	1670.5
	Change (%)		19.7	41.9	23.6	7.2	3.7
Total budget[2]	Budget[3]	10545	11454	12391	13948	14596	15566
	Change (%)		8.6	8.2	12.6	4.6	6.6

Source: Ministry of Planning and Budget, Budget. Each year
Notes: 1. Budget amounts of projects are sums of general account budget and special account budget.

2. Total budget is the sum of general account and special account less transfers between accounts. As of 2003, the central government of Korea has one general account, 22 special accounts and 48 public (special) fund accounts.

3. billion Korean won

2. National Capacity of Information Technology

The successful development of GePS is also due to the

advanced capacity of information technology. In the mid-1980s, Korea launched the e-government project through the National Basic Information Systems that included the completion of national database of finances, vehicle registration and other public information. Since the mid-1990s, the Framework Act on Informatization Promotion drove to upgrade telecommunication infrastructure and build nationwide high-speed networks. As noted before, in order to stimulate the Korean economy suffering from economic crisis since 1997, the President Kim Dae Jung strongly supported IT industry and initiated the national project of 'Cyber Korea 21'. By the end of 2001, network was built in the 144 areas with 155 Mbps – 40 Gbps cables, covering the entire nation. Consequently, 25.65 million people in Korea were using the Internet as of June, 2002, which represents 60% Korean peoples 6 years old or older and over 10 million households subscribed to the Asynchronous Digital Subscriber Line (ADSL) as of October 2002, which is ranked among the top 5 countries in the world (Special Committee for e-Government, 2003 a).

The technical solution for e-procurement systems requires advanced IT, software and hardware. If businesses or pubic agencies in a nation do not have the ability of developing high technology, e-government projects, specifically e-procurement systems, have to find solutions from outside of the nation. Although the Korean economy belongs to the mid-income countries group, Korea has recently transitioned to producing national wealth by exporting high-tech commodities such as semiconductors, cell phones and cars. The capacity of IT industry of Korea has rapidly grown and it supports the e-government projects. E-procurement systems are required to be secure, efficient, and effective. GePS of Korea has solved technical problems by adopting high-tech appliance and world-wide standards from the business in Korea. For security, GePS employs the Intrusion Detection Systems – a hacking detection system and firewall systems. For authorization, Public Key Infrastructure has been adopted, which is used for authorized certificates and cryptographic algorithm. For commodity information and code management in GePS, PPS introduced United Nations Standard Products and Services Code (UNSPSC), used in e-commerce throughout the world. It is also worth mentioning that if external systems do not have high-tech IT, which can be exchanged with internal systems, GePS would not be successful. Advanced systems such as database systems and e-payment systems in the business sector are necessary conditions for

e-commerce. The national capacity of IT is a factor for successful adoption of e-procurement systems of government.

3. Coordination and Support for GePS

GePS is a complicated system linked with 53 external systems, implying that many public and private organizations are involved, even from the time of designing the systems. So, the coordination among agencies' interests and the support from agencies is another critical factor. As mentioned before, the development of the e-procurement systems was not assigned only to PPS, although PPS was already involved in e-bidding and e-shopping system development. During the first period, April 2001 to January 2002, there were 9 ministries involved in designing and developing e-procurement systems including MPB, MIC, Ministry of Industry and Resource as well as PPS. This team is named as the Task Force to Facilitate G2B, initiated by the Director of Government Reform at MPB. This task force asked for consultation from a private firm for BPR of procurement processes and establishment of ISP. Also, the task force hosted several meetings to hear opinions from public agencies, suppliers, commercial associations and organizations for e-commerce. During the second period, from February to December, 2002, PPS took charge of developing the systems and other public agencies and a consortium of private businesses supported PPS. As discussed before, the fund for developing e-procurement systems is not from PPS but from the MIC's special fund, which is directed by MPB.

For the successful adoption of new systems, the interagency relationship is a crucial factor when the system development is initiated by multiple participants and the benefit of the new systems is not limited to a single agency. Who or which organization was in charge of coordinating inter-ministry relationship and drawing supports from other ministries in developing GePS? GePS is a project of government reform – MPB's assignment – and of information technology – MIC's. Even more, GePS requires most public agencies' compliance to use PPS' e-procurement systems rather than traditional paper-based procurement. The administration in Korea is more likely president-centric. The Chung Wa Dae, the President's office, was able to coordinate policy initiatives and to resolve conflicts.

GePS is one of 11 e-government projects, which is directed by the Special Committee for e-Government as a special committee under the Presidential Commission on Government Innovation. The main task of the special committee is to promote interagency collaboration in negotiating issues on the e-government initiatives. The special committee had principles for dealing with e-government initiatives, one of which was to integrate interagency-related initiatives into a single government-wide initiative (Special Committee for e-Government, 2003 a). So, this special committee played the role of coordinating organizations involved in GePS development. With the strong support from the President and the special committee, PPS received other organizations' collaboration. In addition, the support from other organizations had been multiplied with other 10 e-government projects. As seen in the Note 6, GePS project is related with other e-government projects – G4C projects, NAFIS, e-document and e-signature, and government wide computer network projects. It implies that if e-procurement systems development were initiated separately from other e-government projects, it would be much harder to complete the development.

V. Conclusion

This research is about the introduction of the public e-procurement systems in Korea, GePS, and to find factors affecting its successful adoption. GePS is a 'single web-based portal site' that many governments are seeking. GePS is a model of fully developed e-procurement systems composed of information and registration systems, e-purchasing systems, and e-tendering systems. GePS is a result of efforts to realize "the rhetoric" of e-procurement systems in a nation.

GePS is a result of PPS' efforts since 1997 to innovate and to digitalize the procurement processes and systems. The infamous reputation of corruption pushed PPS to reform public procurement processes – streamlining and digitalizing. The first version of e-procurement systems was EDI systems that allowed for requesting contracts and purchasing goods on the Internet. Since 2001, PPS transformed the procurement process by utilizing electronic bidding, electronic contracts and electronic shopping mall. However, the previous systems needed to integrate information on public agency, suppliers, and items, to simplify procure processes, and to

standardize e-commerce systems. The perpetual efforts of PPS to develop more efficient and effective systems are related to the successful development of GePS. However, there still remains a question whether PPS and participants of e-procurement have moved to a new paradigm of procurement. New techniques do not warranty the success of e-procurement systems, as many innovations of public management are not supposed to be. E-procurement systems are expected to save costs; to prevent corruption; and to stimulate business as well as to change the way of administration of Korean government.

With the new e-procurement systems, Korean government is expected to be more transparent and more efficient. Government-wide support from the President and other related agencies is an important factor and high capacity of IT in Korea is anther foundation for the successful establishment of GePS as well. Highly viable information technology for security, authorization, and standardization enabled the development of the e-procurement systems. Institutional collaboration like changing laws and regulations and public agencies' cooperation with e-procurement systems has been matched with the development of GePS. Responding to the demands and the supports of public agencies and firms, PPS has constantly reformed procurement processes with information technology.

For the sustainable development of GePS, further research is required. First, there is a possibility of the business model or profit model with GePS. Because PPS is operated with the commission revenue with the special budget account, the fee for supporting decentralized procurement could be introduced into GePS. After being accustomed to the new systems, PPS can find profit-making model with GePS. Second, for the further development of e-procurement systems in Korea, GePS needs to re-establish the relation with other public e-procurement systems. Currently, procurement information on other systems can be collected through GePS but it cannot be told that procurement services in Korea have been fully integrated into GePS because e-procurement systems for the military and some state enterprises are operated separately. There may be research to find the opportunity of integrating all public procurement systems in Korea. Third, the issues on capacity-building for e-procurement systems should be discussed. It requires recruiting and training human resources to manage and maintain e-

procurement systems, to make decisions on the systems and to develop advanced systems. Last, after the mature implementation of GePS, the research to evaluate the performance of GePS like estimating real cost saving, measuring customer satisfaction, and assessing the impact on e-commerce of the national economy is desired to guide the further development of GePS.

Notes

1. *Government Procurement*. June 2002. p. 46

2. The award includes the Award for the Execution of the Charter of Public Service from the Ministry of Government Administration and Home Affairs in February 2001; the Award for the Satisfaction of the Civil Affairs Administration from the Office for Government Policy Coordination in May 2001; the Award for the Best Reform in Public Service from the Ministry of Planning and Budget in June 2001; Awards for the Best Information-oriented Ministry from the Office for Government Policy Coordination in September 2001 and December 2002; and Awards for the Best Organization of the Government Service from the Office for Government Policy Coordination in May 2002 and January 2003.

3. Table 1. Procurement systems of Korea

Organization	Classification	Centralized Procurement	Decentralized Procurement
Government agencies	Goods and services	- 50 million won or more (foreign goods and services: $50,000) - Annual unit price contract	- Less than 50 million won (foreign goods and services: $50,000) - Food and plants, agricultural and marine products, fire-arms, gunpowder and oil for vehicles
	Works	- 3 billion won or more	- Less than 3 billion won

Local governments	Goods and services	- 50 million won or more (foreign goods and services: $50,000) - Annual unit price contract	- Less than 50 million won (foreign goods and services: $50,000) - Food and plants, agricultural and marine products, fire-arms, gunpowder and oil for vehicles
	Works	PQ and turn-key and alternative bidding constructions	- Entire works except PQ, turn-key and alternative bidding
Other public institutions	Goods and services		- All goods and services
	Works		- All works

Source: PPS, 2003. p.12

Note: 1. PPS provides procurement services for other public institutions by institution's request.

2. Exchange rate: 1$ ~ 1,200 Korean Won (October, 2003)

4. Data source: internal documents of PPS

5. Data Source: http://www.g2b.go.kr/g/i_f05.htm

6. Major e-Government Projects of Korea include 1) Government for Citizen (G4C) systems; 2) Social Insurance Information Sharing Systems; 3) Home Tax Service Systems; 4) Government e-Procurement Systems; 5) National Finance Information Systems; 6) National Education Information Systems; 7) Local Government Information Network Systems; 8) Personnel Policy Support Systems; 9) e-Approval and e-Document between agencies; 10) e-Signature and e-Seal Systems for e-Administration; and 11) Government-wide integrated computer network (Special Committee for e-Government, 2003 a).

7. Table 2. Benefit Estimation of GePS

Components	Work improvements	Benefits (million dollars)

		Private	Public	Total
Simplified process	Cutting down red tapes, etc	104	33	137
Standardized process	Using the standardized way of contracting, etc	437	165	602
Digitalized process	E-bidding, bid notice on the Internet, etc	226	46	272
Integrated data sharing	Obtaining information in the single window, etc	1,714	37	1,751
Total		2,481	281	2,762

Source: Task force for GePS project (MPB, MIC and PPS), January 2002.

8. The central government of Korea has 5 corporate special accounts, which include the rail road service, the communication service, the grain management service, the procurement service and the executive agency service account.

9. Data source: MPB

10. Data source: internal document from PPS

11. The reform programs are based on the International Monetary Fund (IMF) Agreement of December, 1997.

12. For the public works to build database systems of public information, more than 50 million dollars in fiscal years 2000 and 2001 was spent by the central government. Data source: MPB

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