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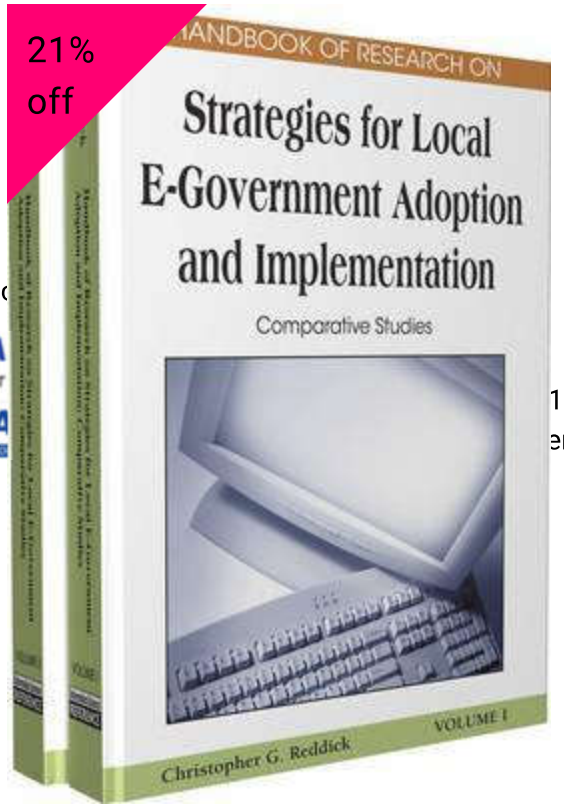

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Handbook of Research on Strategies for Local E-Government Adoption and Implementation:
Comparative Studies

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Volume II

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Section IV
Emerging Technologies and Local E-Government Adoption

Foreword

This book is one of the first to explore e-government in the local context in countries throughout the world. It has many unique qualities of which one is that it focuses on the impact that citizens have on the adoption of e-government. The book also explores what influence e-government has had on the operations and performance of local governments. In my opinion, examining both the supply and demand for e-government makes this book a unique contribution to the field.

In addition, this book provides a rich array of case studies on local e-government adoption in both developed and developing countries. One section goes as far as to provide insights into the cutting-edge technology that is being used in local e-government adoption. Finally, the theoretical section of the book provides the context from which to consider the impact e-government adoption in local governments.

I am very pleased to recommend this book to readers who want to know substantive knowledge about e-government, especially in the context of local governments. I believe that there is a rich array of chapters that address many important facets of e-government in countries throughout the world.

G. David Garson
Professor, North Carolina State University, USA
July 2008

G. David Garson *is a full professor of public administration at North Carolina State University, where he teaches courses on American government, research methodology, computer applications, and geographic information systems. He was the recipient of the Donald Campbell Award (1995) from the policy studies organization, American Political Science Association, for outstanding contributions to policy research methodology and of the Aaron Wildavsky Book Award (1997) from the same organization. He is the author of Guide to Writing Quantitative Papers, Theses, and Dissertations (Dekker, 2001), Neural Network Analysis for Social Scientists (1998), and Computer Technology and Social Issues (1995). In addition he is editor of Social Dimensions of Information Technology (2000), Information Technology and Computer Applications in Public Administration: Issues and Trends (1999), and the Handbook of Public Information Systems (1999). He has also authored or edited 17 other books and authored more than 50 articles. For the last 20 years he has served as editor of the Social Science Computer Review and is on the editorial board of four additional journals.*

Preface

The study of electronic government, known as e-government, in local governments was the first level of analysis of this type of application of Information and Communication Technology (ICT) to public sector organizations (Moon, 1999; Stowers, 1999; Ho 2002; Deakin and Dillon, 2002). Some of the reasons for this are local governments are so numerous and, therefore, make a good test case of the application of ICT diffusion. In addition, local governments are the first line of contact with citizens for simple things such as retrieving information to more complicated tasks like paying taxes online. Therefore, there is a natural tendency for researchers to want to study e-government adoption at the local level.

The growth of research on e-government has rapidly expanded, especially since the commercialization of the Internet in the 1990s. This is most noticeably in terms of the number of publications that address important e-government issues that cut across many areas of public administration research. E-government adoption and implementation are critical to study, especially with local governments, given the nature of what they provide to citizens. Many of the major transformational benefits often cited about e-government are examined through studies of local governments. Most of the books in this field have broadly studied the impact of e-government on all levels of government; this study is different in that it focuses on local governments, which have a very direct line of contact with citizens, given their intensive service delivery role.

THEORETICAL PERSPECTIVES ON LOCAL E-GOVERNMENT ADOPTION

There are five sections in this book, which examine different dimensions of e-government adoption and implementation at the local level. The first section examines theoretical perspectives on the adoption of e-government. The Chapters in this section provide a theoretical lens for which to consider other Chapters in this book. There is an examination of the how e-government fits into the stages of e-government growth and how it has changed, or has the potential to change, the nature of municipal operations. One important aspect in the study of local e-government is its impact on the public sector organizations. In Chapter I, Weerakkody and Dhillon make the argument that scholars need to study transformational e-government, or what they label "t-government," as one of the most important stages of adoption. The second Chapter by Schuppan, examines the idea and application of Informatized Public Service Networks (IPSN) in local e-government, examining the potential of changing the size or possibly eliminating levels of government through information networks. King, in Chapter III, examines citizen-centric e-government in the United Kingdom using the stages of e-government growth models. Paskaleva, in Chapter IV, examines a theoretical framework of e-governance through an integrated city e-governance policy framework as a way of examining e-readiness in European cities. Deakin, Chapter V, examines the idea of intelligent cities and how e-government can potentially increase citizen-initiated contacts

with government and Cotterill in Chapter VI delves into the impact of local e-government partnerships in the United Kingdom. McLoughlin, in Chapter VII, examines the "joining up of services" in the United Kingdom through greater information sharing due to e-government. Reece and Andreasson, in Chapter VIII, explore through an institutional analysis of e-government and found that many social economic variables did not explain e-government quality in cities. Jukić, Kunstelj, Dečman, and Vintar in Chapter IX, take a holistic view to e-government implementation and examine both the supply from local governments and the demand by citizens for e-government. This last Chapter in the section leads particularly well into the next section of the book.

DEMAND-SIDE PERSPECTIVES ON E-GOVERNMENT ADOPTION AND IMPLEMENTATION

The second section of this book examines the demand-side explanations of e-government adoption and implementation. The Chapters in this section delve into the role of citizens in local e-government, examining issues of accountability and participation. One of the ways that local e-government is said to benefit a democratic society is through enabling participation of its citizens in governance. Along these lines, in Chapter X, Torres, Pina, Acerete, and Royo examine transparency, openness, and accountability in public administration through the lens of local European Union e-government. Aikins' Chapter XI findings reveal that city population size and officials' beliefs in traditional and Internet-based citizen participation influences the deployment of resources and the use of the Internet for citizen participation. In Chapter XII, Stuart and Hooper explore the sociological factors that affect voter participation in Internet voting. Knapp, Chen, Hamilton, and Coors in Chapter XIII examine citizen participation in urban planning through interactive 3-D visualization. In Chapter XIV Evans-Cowley and Conroy also examine urban planning through a survey of municipal planning departments and the role of citizen participation in the planning process. Jensen's Chapter XV survey of elected local government officials suggests that there is little political will to use the Internet to facilitate greater levels of participation. Chen and Dorsey, in Chapter XVI, use both the e-government and gerontology literatures to develop a list of factors affecting the demand for e-government among current and future seniors in a small U.S. city. Chen, Huang, Hsiao, Lin, and Lee, authors of Chapter XVII, use experimental design of two citizen conferences in Taiwan (one face-to-face and the other online) to examine the impact of citizen participation in local e-government. As previously noted, the demand-side perspective argues that citizens and their participation is a critical dimension for local e-government adoption; many chapters in this section of the book demonstrate this important finding.

SUPPLY-SIDE PERSPECTIVES ON E-GOVERNMENT ADOPTION AND IMPLEMENTATION

The third section of this book examines the supply-side perspectives on the adoption and implementation of local e-government. The supply-side studies examine issues such as the role of e-government on institutions and their performance. This perspective explores whether e-government has transformed local government in areas such as local service delivery. Greg and Navarro, in Chapter XVIII, examine e-government development from what types of knowledge and skills public managers need to develop and guide e-government initiatives. Huang, in Chapter XIX, conducted a content analysis of county government Web sites, and found that adoption of e-government was significantly correlated with so-

cioeconomics factors such as population, ethnicity, and education. Piotrowski and Borry, Chapter XX, found that the extent to which Web sites increase municipal transparency varied considerably in their content analysis of municipal governments in New Jersey. Holzer and Manoharan (Chapter XXI) in a content analysis of Asian municipal Web sites found that the capacity to provide public services online was largely related to the economy of the nation and financial capacity of the government. Yildiz in Chapter XXII shows that local e-government development is still in its infancy in Turkey. Parlak and Sobaci, in another study of Turkey, evaluated e-government practices in metropolitan municipalities and found that they were inadequate in the provision of Web site-based e-government services (Chapter XXIII). Chapter XXIV by Lombardi, Cooper, Paskaleva-Shapira, and Deakin examined a city eGovernance framework and showed how the content of cities' existing Web sites did not completely satisfy the expectations of the European Union. Freeman (Chapter XXV) found empirical evidence on the existence of various high-yield e-government projects using financial analysis tools such as payback method. Jauhiainen and Inkinen in Chapter XXVI examined quality of life issues as a result of e-government and found that there was much rhetoric in national strategies, however not much in terms of actual reality in local practice. The following section examines some of the e-government technologies that local governments are using in order to increase citizen participation and enhance local service delivery.

EMERGING TECHNOLOGIES AND LOCAL E-GOVERNMENT ADOPTION

Section four of the book examines the emerging technologies the adoption and implementation of local e-government. In Chapter XXVII, Bossinger provides a summary of what open source software is, what is so special about it, and offers several compelling reasons why local governments should be taking a closer look at its abilities. In Chapter XXVIII, Cassell draws on a comparative case study of four European cities and open source software adoption; this author found evidence that migration was driven by a strong desire to maintain control over a municipality's IT infrastructure. Ganapati and Schoepp (Chapter XXIX) argue that wireless broadband is a basic communications tool that is important for digital inclusion, economic development, public safety, better public services, and education. Municipal governments have an important role to play in its adoption. Baker, Bell, and Moon, in Chapter XXX, found that basic municipal wireless networks in U.S. cities accessibility compliance agreements are often overlooked components of the "digital divide" within their communities. Cole, Cole, and Kurtz in Chapter XXXI made the argument that the potential benefit of residential broadband for delivering e-government services to entities outside government – in particular, individuals, households, or small organizations – is at least equal to the benefits of performing government-to-government processes electronically. Viitanen and Kingston (Chapter XXXII) demonstrate how improvements in local communities could be delivered through the integration of Geographic Information Systems (GIS) with a range of public services. In Chapter XXXIII, Murphy reviews emerging GIS economic development applications as a way to encourage economic development in local communities. Jaeger, in Chapter XXXIV, indicates that as residents, communities, and governments rely on public libraries as a main access point to e-government, it is essential to understand the connection and education roles of public libraries to improve the delivery of local e-government. In Chapter XXXV, Kamal and Themistocleous express the need to understand the adoption of enterprise application integration in local government authorities to addresses organizational integration problems from both technical and business perspectives.

CASE STUDIES ON LOCAL E-GOVERNMENT ADOPTION

In the last section of this book, there is a presentation of several case studies of e-government adoption and implementation. These case studies present successes and challenges to the adoption of e-government at the local level. In Chapter XXXVI, Roy notes that Canada faces greater challenges in collaborating across jurisdictional boundaries than Denmark and that weaker municipal capacity within the Canada are a major reason for this author's finding. In Chapter XXXVII, Stowers argues that a small U.S. city such as San Carlos, Calif., is an e-government innovator because of factors such as location, that allow the creation of resources through networking with knowledge individuals supporting the development of regional agency/community collaborations. In Chapter XXXVIII, Frank believes that in Florida, Miami-Dade's county government experience with performance management software implementation is consistent with that found elsewhere in the private and public sectors; clear benchmarks for successful implementation were not carefully articulated prior to rollout. In Chapter XXXIX, Nasi examines e-government in Italian local governments and found that these governments have not established an organization-wide strategy for e-government that aligns organizational priorities with adequate resource commitment. Ask, Hatakka, and Grönlund (Chapter XL) examine e-government in Örebro City, Sweden, and found that the lessons learned are the needs for practical ways of acting strategically to reduce the risk level and increase the ability to implement policy. Chung (Chapter XLI) reviewed local e-government adoption in rural South Korea, which was designed as a way of reducing the digital divide and improving local economies. In Chapter XLII, Sarosa and Lestari found that Jogjakarta's local governments only used their Web sites to publish necessary information, thus, few interactions between local government and citizens really existed. Chapter XLIII, Kaliannan, Abdullah, and Raman show that local governments in Malaysia are still at the broadcast or publication stage of e-government development. In Chapter XLIV Lubbe and Singh, when investigating local educational institutions in South Africa, found that users' perception of information systems usefulness has an impact on the views of the quality of the system. Filho and dos Santos Junior in Chapter XLV show that ICT in municipal government in Brazil were designed in such a way that they resemble the traditional political structures; maintaining politics as usual and avoiding new forms of interaction and participation. Chapter XLVI, Mitra, Gupta, and Sahu found that in provincial and local police systems in India, there was an acute problem of training, funding, and technical manpower issues. Finally, in Chapter XLVII, Juntunen investigates e-services in Finnish police and found that there were unclear roles and responsibilities in different cooperation networks, which can hinder the development in joint e-service projects.

CONCLUSION

This book addresses issues faced by local governments in e-government, addressing both its impact on citizens and government operations and performance. Exploring major technologies that are used and providing case studies of successes and challenges in adoption in local governments, some of the lessons that can be extrapolated from this book are that more citizen involvement in e-government at the local level enhances democracy and transparency in governments. Furthermore, e-government as envisaged by early studies about claims concerning its revolutionary properties has largely not materialized. However, there is hope in e-government adoption and implementation according to many scholars in this book, that it can potentially radically transform government and many facets of our information society.

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Chapter XLII
The Level and Impact of Web Based E-Government Adoption: The Case of Jogjakarta's Local Governments

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ABSTRACT

This chapter examined the state of Jogjakarta's local governments Web sites (i.e, Bantul, Sleman, Kulon Progo, City of Jogjakarta and The Special Province of Jogjakarta provincial government). There are few tools available to assess e-government Web sites. We used the framework developed by Stanton, UNPAN, Indonesian Government, and CIPSODA proposed by Heeks. Stanton's frameworks emphasized the use of ICT by local government for better interaction with the citizen. This framework is inline with the UN framework that aimed at building a people-centred and inclusive information society. Stanton identified 4 e-government sub spaces (i.e. publish, interact, transact, and transform). Indonesian government rules were leaning toward Web-based e-government. We used those tools to evaluate and observe the impact of e-government and also observed the state of ICT infrastructure in Indonesia that might be hindering the adoption of Web-based e-government and suggested an alternative.

INTRODUCTION

With e-government readiness index of 0.3819 Indonesia was ranked 96 out of 191 UN member states[1]. This ranking was far behind other South East Asia countries such as Singapore (7), the Republic of Philipines (41), Malaysia (43), Thailand (46) and Brunei Darrusalam (73). Indonesia experienced an 11 points decrease compare to prior

year ranking (85). This ranking was partly based on e-government web site assessment.

As Indonesia adopting decentralized governance that give considerable autonomy to its provinces and local governments, the whole picture of Indonesia would be better if the portrait include an assessment of province and local government web sites. This approach is also of benefit considering Indonesia has a great deal of heterogeneity in term of economic development, infrastructure and human resources quality. The Special Province of Jogjakarta[2], the region where the researchers live, was chosen as the object of this research.

This chapter examined the state of Jogjakarta's local governments web sites (i.e, Bantul, Sleman, Kulon Progo, City of Jogjakarta and The Special Province of Jogjakarta provincial government). Our previous findings (Sarosa & Lestari, 2006) confirmed that the rate of adoption of e-government website in Jogjakarta is quite low. For example, the interaction forum within the website of Kulon Progo was frequently visited by 400 people compared to the total of Kulon Progo's recorded population of more than 400.000 in 2005. We evaluated the web-based e-government deployed by Jogjakarta's local governments using several different tools including a guidance issued by the government of Republic of Indonesia in form of Presidential Instruction (Indonesia, 2003b) and Minister of ICT decree (Minister, 2003).

By looking at our evaluation result and the current state of internet adoption, we proposed a new media of e-government service delivery in form of mobile device. Our conclusion is supported by the recent research in mobile e-government and high rate of mobile technology adoption in Indonesia.

On the next sections, we will discuss the web-based e-government and how to assess e-government readiness, followed by the current state of e-government in Indonesia, our analysis, and lastly we present our conclusions.

WEB-BASED E-GOVERNMENT

E-government can be broadly defined as the use of ICT in the-government sector ranging from the use of stand alone computer and telephone, office automation to the used of the most sophisticated web-based e-government (Heeks, 2006; Mosse & Whitley, 2004; Shackleton, Fisher, & Dawson, 2004; Stanton, 2005; UN, 2005). In this sense e-government has been with us long before this terminology widely used. Nowadays, however, the term e-government tends to refer to web-based e-government as more and more government and its departments moving to the web. This chapter, therefore, focus on web-based e-government aspects.

E-government can be seen as a 'socio-technical system' consisting of technical aspects (information and technology) and social aspects such as people, organization and environment (Avison & Fitzgerald, 2002; Heeks, 2006). Further Heeks (2006) proposed a checklist called ITPOSMO to describe "what an e-government is". ITPOSMO stands for:

- **I**nformation refers to the formalised information kept by the systems and used by the user of the systems.
- **T**echnology refers to the digital or IT technology but also supporting non digital technology such as manual systems.
- **P**rocess refers to e-government stakeholder's activities (both information and business related processes).
- **O**bjectives and values refer to the main objectives and values of e-government systems. It might be political, formal strategies, cultural issues that include subjective truth, etc.
- **S**taffing and skills refer to number of staff involved with the systems and their competencies.
- **M**anagement system and structures refer to the required management systems to organise and maintain the systems and also

the structure (both formal and informal) of systems' stakeholders.
- **O**ther resources and outside world refer to resources required to implement and operate the e-government systems.

ITPOSMO emphasized that e-government is not only information system but also social system. Its success and failure, then, is greatly influenced by both technical and social factors.

The purpose of e-government can be classified as follows (Indonesia, 2003b; Stanton, 2005; UN, 2005):

- Citizen centric to serve the citizen's needs and interests.
- Result oriented to produce goods and services.
- Market based to compete or create a relationship industry and non governmental institution.

In Indonesia, e-government development and deployment are based on Presidential Instruction number 3, 2003 Titled "National Policy and Strategy for Developing E-government". Indonesian Government's purpose to established e-government is to develop electronic-based government services in order to improve quality, effectiveness, and efficiency of service delivery to its citizen (Indonesia, 2003a, 2003b). The use of electronic-based government (information technology) consists of two activities, which are (Indonesia, 2003a, 2003b):

- Data processing, information management, systems management, and workflow management.
- Utilising technology to enable easier access to public services by all citizens in Indonesia.

The objectives of e-government initiatives in Indonesia are (Indonesia, 2003b):

- Formation of a network of information and public services with coverage and quality that can satisfy by citizens of Indonesia and enable access for citizens without limitation of time and space.
- The creation of interactive relationship between business and government to improve national economy and enhanced capability for competing with ever changing international trade.
- The creation of mechanism and communication channel for interacting with government institutions, citizens, and businesses. Also providing a public space for dialogue and enabling citizens to participate in policy making.
- Development of transparent and efficient systems management and working process and to improve transaction flow and service between central government and local governments.

Both documents showed that Indonesian government assume that e-government is synonym with web-based e-government.

REALITY OF E-GOVERNMENT IN INDONESIA

We assessed provincial and local government web sites using two steps assessment. First we analysed the available facilities on the web sites. Secondly, we investigated the use of the facilities. The second step is needed to check whether the available facilities had been used to promote local government - citizen interaction.

The Special Province of Jogjakarta, the region where the researchers live, is one of provinces in the island of Java. This geographically small province consists of 5 local governments namely Sleman, Kulon Progo, Bantul, Jogjakarta City and Gunung Kidul. As of June 2007, all but the

local government of Gunung Kidul have already set up the official website.

Famous for its vibrant students life and cultural values, Jogjakarta is home of many private and state universities. In most location where major universities situated, the internet café can be easily found mainly to serve students need. Some big universities (state and private alike) provide free wireless internet connection. Currently the city also enjoyed the broad band service provided by local cable TV, Indonesian Telecommunication (PT Telkom), and several privately own Internet Service Providers (ISPs). Unfortunately, the situation is significantly different in the rural area where internet access is very limited or even unavailable.

We will now look at the reality of Information and Communication Technology (ICT) in Indonesia. First, the Table 1 described the forecast of ICT infrastructure requirements.

In year 2005, the Indonesian Internet Service provider association (APJII) made a forecast that the Internet connection customer number would reach 1,5 millions while the Internet user number would reach 16 million (APJII, 2005). Previous research in government role for ICT diffusion has confirmed that the internet connection infrastructure problem should be solved by the Indonesian government by Nusantara 21 project which will rolling out telecommunication network covering all Indonesia (Utomo & Dodgson, 2001). Later research in similar area have seen the government effort was postponed and later abandoned (Sarosa & Underwood, 2005; Sarosa & Zowghi, 2005). However, recently Indonesian government also announced the new project called Palapa Ring to substitute Nusantara 21 which will deploy a network of fibre optic to cover all Indonesian territory with high speed data communication networks up to 20 GBps (Broto, 2007). Palapa Ring has attracted interest from 21 major telecommunication companies in Indonesia and estimated to cost 15 trillion rupiah in the next 10 years. In the meantime, supported by Indonesian largest telecommunication company, Indonesian Ministry of Education has been deploying Indonesian Education network which will connect all schools, universities, and institution within Indonesian Education community (Dikti, 2007). The project is estimated to finish by 2010.

Meanwhile, Indonesian's lack of Internet penetration has been compensated by penetration of

Table 1. Requirements forecast for Indonesian ICT Infrastructure (Djalil, 2007)

Year end	Fixed Line		Mobile		Internet	Multimedia
	Capacity	Penetration %	Customer Capacity utilisation	Penetration %	User (in million)	User (in million)
2006	10.454.115	4,6	33.303.941	14,59	4,371	3,637
2007	11.594.976	5,0	38.622.073	16,70	5,863	4,866
2008	12.963.259	5,5	43.940.204	18,76	7,680	6,363
2009	14.591.029	6,1	49.258.336	20,76	9,853	8,153
2010	16.510.494	6,9	54.576.467	22,71	12,417	10,265
2011	18.753.716	7,7	59.894.599	24,62	15,403	12,725
2012	21.352.879	8,7	65.212.730	26,48	18,847	15,562
2013	24.340.042	9,8	70.530.862	28,29	22,779	18,801
2014	27.747.373	11,0	75.848.993	30,06	27,233	22,471
2015	31.607.041	12,4	81.167.125	31,79	32,243	26,598

mobile phone and mobile devices as depicted by the following Table 2.

The table showed 4 major mobile phone operators in Indonesia. In 2006-2007 periods, at least 3-4 new operators have been granted operation licenses and have started deploying their network. The new operators have been aggressively promoting their product aiming at mostly low-end market with aggressive low pricing. Also starting in 2006, all the three major mobile operator have been deploying their 3G and High Speed Downlink Packet Access (HSDPA) network for broadband wireless data connection followed by the increase in sales of related devices (Excelcomindo, 2007; Indosat, 2007; Telkomsel, 2007). We observed even many of our students in the university have at least two mobile phones.

ASSESSING E-GOVERNMENT READINESS

There are many proposed models to benchmark the level (web-based) e-government adoption. Some of them based on citizen-centric approach, where the citizen become a focal point (Stanton, 2005; Wang, Bretschneider, & Gant, 2005), while some others using similar methods as e-business evaluation methods (Mosse & Whitley, 2004; Shackleton et al., 2004). Those who favour for models originated from e commerce might argue that government conducts business as commercial corporations do, while those who favour citizen centric approach argue that government's businesses have a unique characteristic. Government has special role as regulator and policy maker, yet at the same time it also provides unique services without any competitors such as tax payment, birth certificates, driving licences, etc (Wang et al., 2005). Therefore they do not believe in using commercial corporations' evaluation methods for government services.

This chapter will summarize and use some of them. The first one is the CIPSODA model proposed by Heeks (2007), the next two models are sequentially implemented stages model pronounced by the government of the Republic of Indonesia and Department of Economic and Social Affairs of the United Nations. The last model we will review is community centric virtual government bay Stanton (2003)

CIPSODA

Heeks (2007) proposed a check list of 'what e-government does'. This check list is labeled as CIPSODA. The CIPSODA stand for:

- **C**apture: Where raw data required for the e-government systems gathered.
- **I**nput: The data gathered were entered into the e-government systems.

Table 2. Mobile phone users in Indonesia by 2006

Operator	Customers (In million)	Source
Indosat	16.7	(Indosat, 2007)
Telkomsel Halo Simpati As Total	 1.66 21.38 12.56 35.54	(Telkomsel, 2007)
XL	9.5	(Excelcomindo, 2007)
PT Telkom	4.175	(Telkom, 2007)

- **P**rocess: Raw data were processed.
- **S**toring: Both raw and processed data were stored on the systems.
- **O**utput: Processed data were issued and distributed to the user.
- **D**ecision making: The processed data were used to make decision.
- **A**ction: Decisions made in previous stage were implemented.

We could misleadingly say that the CIPSO are the technical task of e-government while the D and A are the social context of e-government. Instead, consistent with the notion of ITPOSMOO and socio-technical system previously proposed by Heeks (2006) in each step of the CIPSODA, we can see the blend of social and technical aspects of e-government. For example, the seemingly technical CIPSO is greatly influenced by human behaviour. The people capture and input the data. Thus, from the very beginning this process has involved human perception and motivation (Heeks, 2006 p. 82).

Indonesia Presidential Instruction Number 3 Year 2003 (Indonesia, 2003b)

In 2003 the-government of the republic of Indonesia promulgated Presidential Instruction Number 3/2003 entitled *"National policy and strategy for e-government development"*. This presidential instruction subsequently followed by the Decree of The Minister of Communication and Information number 57/Kep/M.Kominfo/12/2003 titled *'The guidelines for the preparation of e-government development master plan"*(Minister, 2003). Implicitly, what it means by e government in these decrees is web-based e-government. In developing web-based e-government, these decrees followed the sequentially implemented stages model. The Government has set out four stages of e-government evolution:

- **Stage 1: Preparation**
  - Setting up information site in each departments and government's bodies
  - Human resources preparation
  - Preparing easily access points such as multipurpose community centre, internet cafe, small and medium enterprises centre
  - Informing the existence of information sites to internal and external party
- **Stage 2: Maturity stage**
  - Setting up interactive public information site
  - Setting up department interconnected interface
- **Stage 3: Established stage**
  - Setting up public service transaction site
  - Setting up application and data interoperability among departments
- **Stage 4: Integrated**
  - Setting up application for integrated G2G, G2B and G2C services

Department of Economic and Social Affairs of the United Nations

In its global e-government readiness report 2005 (UN, 2005), Department of Economic and Social Affairs of the United Nations employed sequentially implemented stage model to benchmark web-based e-government of 191 countries. The web measure assessment model that they used has 5 sequential stages ranging from simple site consisting relatively static information to the most sophisticated web-based e-government that allows for Government to Government (G2G), Government to Business (G2B), and Government to Citizen (G2C) integrated interaction. The five stages of e-government evolution are as follow(UN, 2005):

- **Stage 1, Emerging presence:** This stage representing simple web site containing relatively basic static info.

- **Stage 2, Enhanced presence:** This stage representing a more complete information that enable citizen to search for documents.
- **Stage 3, Interactive presence:** In this stage government site is updated quite frequently. The site also provides many downloadable forms. Moreover citizens are able to contact government officer through all means of ICT (e mail, fax, telephone etc).
- **Stage 4, Transactional presence:** In this stage, the site enables Government to citizen interaction. It also provide the possibility for citizen to complete online transaction.
- **Stage 5, Networked presence:** This is the highest and most sophisticated level of e-government in which e-government is able to integrate G2G, G2B and G2C interaction.

Stanton's Framework (Stanton, 2005)

Stanton proposed the concept of 'community-centric virtual government' in which citizen is the focal point. This approach emphasizing on citizen interaction so that benchmarking will not merely measuring superficial features that can be measured. Basically Stanton's framework classified E-government in four different stages, which are:

A. **Publish – Providing Information (Data in context):** This state includes primary and secondary components of web site such as the availability of static and strategic information for the user. We find that all of the official web sites have provided the wide variety of information and strategic docu-

Table 3. Stantons' framework adapted (Stanton, 2005)

E Space	Sub Space	Primary e Components	Secondary e components
E-government On line process Implementation "Push" Conceptual Model: Government focus VEE	**Publish** Providing information –"data in context"	Static and Strategic information available for download	Information documents Strategic Documents
	Interact Two-way communication with the citizen. Citizen feedback	Common entry points Access to information to do business with government	Downloadable forms/ documents Site search Email to officers Employment Tenders Information Portal
	Transact Citizen can conduct and complete transactions online	Access to transactions online or in person Seeking feedback	Payment on line E mail to officers
	Transform Integrated virtual government	Submission tracking End-to-end process integration E-business opportunities	E-ECRM Central government portals for all services and links Integrated supply chain Business Portals

ments. The sites provide menus that enable citizen to gain information on government vision, mission, planning, economic data, law and regulations, geographic conditions, demographic data, potential natural resources, news and announcements.

B. **Interact:** Two-way communication with the citizen and citizen feedback. This stage include primary and secondary components of web site such as common entry points, access to information to do business with government, the availability of downloadable forms, site search, e mail to officers, employment and tenders.
C. **Transact:** The sites enable citizens to conduct and complete transactions on line such as paying taxes, fines, etc.
D. **Transform:** Integrated virtual government**,** which also include e-vote.

Stanton (2005) believed that e-government could evolve from just information provider toward citizen centric. The ultimate goal is to enable citizen to actively involve in the governance processes, such as e-vote, e-consultation, etc.

Comparing the Frameworks

In Table 4, we summarised the four frameworks in assessing e-government readiness.

Notably, CIPSODA is shown as a single row and column. We argue that CIPSODA did not really distinguish the level of e-government adoption. We could not help to see the similarity of CIPSODA similarity with a decision-making process preceded by an information processing activities. Therefore, we argue that CIPSODA could be conducted anywhere within any stage of e-government adoption as long as information processing and decision-making process are involved.

For the other three frameworks, we mapped the stage of e-government adoption and put each similar or equal stage within the same row. As shown in Table 2, preparation stage (Indonesia, 2003a, 2003b), emerging and enhanced presence (UN, 2005), and publish stage (Stanton, 2005) are equal, which is providing access to public information and archives. The UN framework distinguishes the basic information provided (in emerging presence) and the ability for user to search through the archive using automatic search facilities (enhanced presence). Maturity stage, interactive presence, and interact stage are similar which is the government able to interact or communicate with their citizens using email, instant messaging, forums, etc. The established stage and integrated stage are comparable to transactional presence and transact stage. These stages is where e-government facilities enable

Table 4. Comparison of the four e-government readiness assessment frameworks

Indonesian Government (Indonesia, 2003a, 2003b)	UNDESA (UN, 2005)	Stanton (Stanton, 2005)	CIPSODA (Heeks, 2006)
Preparation	Emerging Presence Enhanced Presence	Publish	Capture Input Process
Maturity Stage	Interactive Presence	Interact	Storing
Established Stage	Transactional Presence	Transact	Output Decision Making
Integrated	Networked Presence	Transform	Action

the citizens conducting transactions such as paying taxes, fines, traffic ticket, etc. It also enables vendors to bid on government tenders.

The last stage is where the e-government becomes the tool for democracy (e-democracy). Only UN and Stanton's assess this stage. Indonesian government stopped the development of e-government up to integration of all government services across all government agencies and departments. The other two not only integrate e-government services but also aim for facilities where citizens could be involved in decision and public policy making process.

ANALYSIS

We assessed provincial and local government web sites using 2 steps assessment. First we analysed the available facilities on the web sites. Secondly, we investigated the use of the facilities. The second step is required to check whether the available facilities had been used to promote local government - citizen interaction.

1. *The available facilities:* Many data were available for citizen. We had checked data availability and found that all of the official web sites provided the wide variety of information and strategic documents. The sites provided menus that enable citizen to gain information on government vision, mission, planning, economic data, law and regulation, geographic conditions, demographic data, potential natural resources, news and announcements. Searching facility and downloadable documents are also available on most sites. Some site (Bantul, Sleman and Jogjakarta city) even provide downloadable form but not the facility to complete online transaction. Sites were up dated quite frequently. Moreover sites also provide tools for citizen-government interaction by setting up mailing list and the e mail address that enable citizen to contact officer. Unfortunately the sites provide neither facilities to conduct and complete online transaction nor facilities of integrated virtual government.
2. *The use of the available facilities:* Sites have provided extensive data and information; unfortunately site visitors are very insignificant compare to total population. Data from the official site f Ministry of communication and information technology showed that this site only being hit by a small number of internet users.

All sites contained menus that enable local government – citizen interaction, but it seemed that the facilities had not been used optimally. Kulon Progo web site provided chat menu, but when we tried to use it, it did not work. This site provided an on line pooling on many topics, but the participants were very limited compared to the total population.

Bantul's web site provided the interactive facility under interaction menu. Unfortunately, Bantul's local government never gave any on line comment on the discussions. Sleman's e-government site is slightly better than Bantul. The site provided discussion forums among citizens and letter from the citizens' menus that enabled citizens to make certain inquiries and comments. Unfortunately, most of the government answers were standardized statement such as:

Answer to general questions will be published trough the website. Answer to personal questions will be sent by email.... (Sleman –E-Government web site)

Sometimes even for non personal questions, the standardized answers were given on the site.

The Government of Jogjakarta and The Government of Jogjakarta Special Province on line interaction facilities were used far better than the other three e-government sites. The Government of Jogjakarta had a link to a sub section of their web

site called UPIK site (Unit Pelayanan Informasi dan Keluhan = *Complain and Information Unit).* This sub site enabled registered citizens to make on line complains, gather information and check the status of their submitted complain. We had tried to use this facility to make an inquiry and the results were given within two working days.

The Government of Jogjakarta Special Province provided on line interaction using email and Yahoo! Messenger. The officers were very responsive. During the time of earthquake recovery, we tried to gather information regarding cleaning facilities for damaged houses and we received immediate responds.

All sites did not facilitate on line recruitment and tenders. Sites just announced the job vacancies and tender information but never processed it on line. Some sites provide downloadable documents but do not provide facilities to complete on line transaction. The above facts reveal that the province and local government web sites in Jogjakarta had not moved from web-based information publishing to e-transactional presence and far from being an integrated virtual government.

Presented below is the level of Jogjakarta web-based e-government adoption using four benchmark models (CIPSODA, UNPAN Frameworks, Stanton's framework, and Presidential Instruction).

CIPSODA checklist analysis reveals the following findings:

- Capture: There is no evidence that the government website collected data nor the citizen could obtain data required for their e-government related activities (such as paying taxes).
- Input: We could not find any input forms.
- Process: In line with our previous findings, there is no evidence of processing.
- Store: Obviously the data and information presented are stored somewhere. Most of the government often outsource their data storage and also the website hosting to a third independent party (usually Indonesian ISPs).
- Output: We believed that the current website is to publish output in form of local's information and regulations.
- Decision: There is no evidence of decision made based on the e-government system.
- Action: Again we could not find any evidence of implementation.

Overall we concluded that the local government's website is used for publication purposes only. It is need to be noted though that some kind of interaction in form of instant messaging have been used in provincial government. However, we do not think that such interactive facilities justified the investment of a website. If the Input – Process – Output were conducted it must be outside the systems. Raw data were gathered and processed. The output then entered into the e-government website as the content.

Table 5 shows analysis based on Indonesian Presidential Instruction Number 3 Year 2003 and Minister of Communication and Information decree number 57/Kep/M.Kominfo/12/2003.

Table 5 shows that Jogjakarta's local government sites are still in the 2nd stage. The available facilities for interaction are not used quite frequent by most citizens. Furthermore the Presidential Instruction (Indonesia, 2003b) stated that the use of ICT could be viewed from the following aspects:

- E-Leadership which refer to the government's initiative and priority to anticipate the use of ICT.
- Condition of ICT infrastructure
- Management of information
- Business environment which refer to market condition, trade systems, and market regulations in the context of ICT.
- Human resources and diffusion of ICT into aspects of citizens' life.

Table 5. Analysis based on presidential instruction (Indonesia, 2003b) and minister of communication and information decree (Indonesia, 2003a)

Stages	Jogjakarta's web based e-government	Remarks
Stage 1 – Preparation		
- Setting up information site	V	All but local government of Gunung Kidul have already had official web-site.
- Human resources preparation	V	Quite frequent web site up date shows good preparation of human resources. More raining needed to proceed to the next level of e-government.
- Preparing easily access devices such as Multipurpose Community Center, internet cafe, SME-Center	V	Internet Cafés, free hot spot have been available but it is concentrated in the urban area and the university surrounding area. In most rural area internet connection is very difficult or in many areas do not exist.
- Informing the existence of information site to internal and external party	V	Site launching usually followed by a media covered ceremony covered.
Stage 2 – Maturity stage		
- Setting up interactive public information site	V	All sites have provided facilities for citizen discussion. Some site provide on line consultation by e mail the other (Jogjakarta special province site) use yahoo messenger. Unfortunately the interaction facility are not used by many citizen.
Setting up department interconnected interface	X	There were no evidence of interconnection except of
Stage 3 – Established stage		
- Setting up public service transaction site	X	Two sites provide downloadable document while the other three sites provide not only downloadable documents but also downloadable forms. None of those sites, however, provides provide facility to complete on line transaction.
- Setting up application and data interoperability among departments	X	
Stage 4 - Integrated stage		
- Setting up application for integrated G2G, G2B and G2C services.	X	

Legend: V = Present
X = Not Present

The Indonesian government also realised that Indonesian ICT readiness level is among the lowest in the world and require a huge boost from government (Indonesia, 2003b). So far we did not find any evidence except for Palapa Ring initiative (Broto, 2007).

Next, we used Department of Economic and Social Affairs of the United Nations Web measure assessment model (see Table 6).

Based on the web measure assessment model, Jogjakarta's sites reach 3rd stage (interactive

Table 6. Analysis result using UNPAN's framework (UN, 2005)

Stage	Jogjakarta sites condition	Remarks
Stage 1, emerging presence: this stage representing simple web site containing relatively basic static info.	**V**	All sites contain basic information.
Stage 2, enhanced presence: this stage representing a more complete information that enable citizen to search for documents	**V**	Information provided on the sites are quite comprehensive. Document search tool available in most sites.
Stage 3: Interactive presence, In this stage government site is up dated quite frequently. The site also provide many downloadable forms. Moreover citizen are able to contact government officer through all means of ICT (e mail, fax, telephone etc).	**V**	Sites up dated quite frequent. All sites contain news and current events. Two sites provide downloadable documents only while the other 3 provide not only downloadable documents but also downloadable forms. All sites provide list of officer, important address and phone number. Jogjakarta City site provide e mail address for complain and consultation, while Jogjakarta special province provide direct contact using yahoo messenger.
Stage 4: Transactional Presence. In this stage, the site enable Government to citizen interaction. It also provide the possibility for citizen to complete online transaction	**X**	
Stage 5: Networked Presence.This is the highest and most sophisticated level of e-government in which e-government is able to integrate G2G, G2B and G2C interaction.	**X**	

Legend V = Available
X = Unavailable

presence). Although limited to instant messaging clients which is not an integrated part of e-government systems.

Analysis using Stanton's community-centric virtual government is shown in Table 7.

The findings show that Jogjakarta's sites have provided menu for publishing information and facilitating citizen interaction. They have not provided menu that enable on line transaction and far from integrated virtual government stage. Overall, based on our assessment using four different tools (including one from Indonesian Government), Jogjakarta local governments' website are still only for publication purposes with some degree of interaction. We could not find how much the government have spent to develop and maintain the website. Anecdotal evidence we gathered from interview with some web-hosting and web-development providers showed that the cost of such website typically between 20-40 million rupiah. The cost of data preparation and cost of continuous maintenance is unknown.

Based on the policies (Indonesia, 2003a, 2003b), it seemed that the Government of Republic of Indonesia have realised the importance of e-government effort inline with the UN report (UN, 2005). However Ministry of Communication and Information decree below (Indonesia, 2003a) somewhat contradict the Indonesian ICT condition:

The development of local government's website is the first stage of the development of e-government in Indonesia. The objective is to enable easier

Table 7. Analysis result using Stanton's framework (Stanton, 2005)

E Space	Sub Space	A	B	C	D	E	Primary e Components	A	B	C	D	E	Secondary e components	A	B	C	D	E
E-government On line process Implementation "Push" Conceptual Model: Government focus VEE	**Publish** Providing information – "data in context"	V	V	V	V	V	Static and Strategic information available for download	V	V	V	V	V	Information documents	V	V	V	V	V
													Strategic Documents	V	V	V	V	V
	Interact Two-way communication with the citizen. Citizen feedback	V	V	V	V	V	Common entry points	V	V	V	V	V	Downloadable forms/documents	V	V	Y	V	Y
							Access to information to do business with government	V	X	V	V	V	Site search	V	V	X	V	V
													Email to officers	X	X	X	V	V
													Employment	X	X	X	X	X
													Tenders	X	X	X	X	X
													Information Portal	V	V	V	V	V
	Transact Citizen can conduct and complete transactions online	X	X	X	X	X	Access to transactions online or in person Seeking feedback	X	X	X	X	X	Payment on line	X	X	X	X	X
													E mail to officers	X	X	X	V	V
	Transform Integrated virtual government	X	X	X	X	X	Submission tracking	X	X	X	X	X	E-ECRM	X	X	X	X	X
							End-to-end process integration	X	X	X	X	X	Central government portals for all services and links	X	X	X	X	X
							E-business opportunities	X	X	X	X	X	Integrated supply chain	X	X	X	X	X
													Business Portals	X	X	X	X	X

LEGEND:

A: The official website of Bantul (http://www.bantul.go.id)
B: The official website of Sleman (http://www.sleman.go.id)
C: The official website of Kulon Progo (http://www.kulonprogo.go.id)
D: The official website of Pemerintah Kota Jogjakarta (http://www.jogja.go.id)
E: The official website of Pemeritah Provinsi Jogjakara (http://www.pemda-diy.go.id)
V: The facilities are available
X: The facilities are not available
Y: Site only provide downloadable documents but not downloadable forms

access by Indonesian citizen to access information and services provided by local government and to participate in democratic process by using Internet.

We argue that the current internet access and penetration rate, majority Indonesian citizens especially outside Java Island will be in disadvantage side due to lack of access. Even in Java itself, access to Internet is not as wide as telephone and mobile telephone. Therefore by insisting that website is a first step toward e-government (Indonesia, 2003a), the objective of e-government initiative would be hard to be achieved.

CONCLUSION AND FUTURE WORKS

Our evaluation shows that Jogjakarta's local governments were still in publish state with a slight variation in government-citizen interaction through email, Yahoo! Messenger, online forums, and online forms. Most of the interactive facilities were used by and among the citizen. Only few were replied by government officials. The exceptions were The Government of Jogjakarta and The Government of Jogjakarta Special Province with their immediate response toward our inquiry.

Jogjakarta's local governments so far only used their website to publish necessary information. They also provided various methods for the citizen to interact with government official by providing email address, online discussion forums, online forms, and Yahoo! Messenger. However, only few interactions between local government and citizen really exist.

Wang et.al. (2005) argued that government has a unique business position where they could not be replaced by commercial corporations in providing specific services (such as tax payment, birth certificates, driving licences, etc). Using their websites merely as a mean of publication, Jogjakarta's local government did not fully optimise their e-government investment. The website only supported a fraction of the whole government businesses, which is information dissemination. Such investment should be optimised by expanding it facilities as a mean of communication toward democracy, accountability, and transparency as suggested by citizen-centric approach. Our brief observation showed that most of the interactions between and among citizens were conducted by a handful of citizens. A pooling in Kulon Progo website only filled by 104 people compared to total population of more than 400,000. We believe that merely providing information would not attract more citizens to use the website because the price of Internet access in Jogjakarta was not cheap and not considered as a high priority expense for most of the population. Therefore, setting up governmental website as an information dissemination tool would be failed since citizens could obtain the similar information at more affordable price from other sources. Additional services and additional affordable internet access points need to be considered to attract more users.

Jogjakarta local government is confronted with the fact of e-government low usage. Confronted with such fact of low usage web-based e-government, the objective of e-government for effectively and efficiently improved public services is far from the reality. The low usage of e-government may be because the unequal connectivity. Internet connection is concentrated in the urban area. Only some universities and shopping mall provide free wireless connection. The cost of internet connection is relatively expensive compared to average income. In the rural areas, the internet connectivity is worse or even not exists at all. At the national level, internet penetration is only 8.7% or 20.000.000 users and it is concentrated in Jakarta for about 70% (Djalil, 2007).

As equal connectivity is the prerequisite for equal opportunity in sharing the advantage of e-government, pushing web-based government to move the next level (i.e enabling e-government to process transactions) in the absent of equal

connectivity will present local governments with the danger of digital divide. It means that moving public services to the web without equal access to the same services for all of citizen will create in equal opportunity and exclusion of citizen without effective access to the technology. To avoid digital divide, it is suggested that Jogjakarta local government employed ICT means other than web-based e-government while simultaneously preparing equal effective access to the internet among citizen.

Some studies have explored the alternatives of e-government deployment using other channel. Particularly, we saw studies on the use of mobile devices (mobile phone, handheld computers, PDAs, etc) as tool for accessing e-government services. For example, in Seattle (Fidel, Scholl, Liu, & Unsworth, 2007; Scholl & Fidel, 2007) a study of the deployment of wireless devices such as PDA, mobile phones, and ultra mobility laptop for e-government services is on the way.

At this stage, without further studies we feel that mobile-based e-government is more suitable to Jogjakarta local government for the following reasons:

a. At the national level[3], the number of mobile phone users is significantly higher than the number of internet users. As of 2006, Indonesia mobile phone market consist of 68.000.000 customers (Excelcomindo, 2007). This number is far higher than that of internet users.
b. Mobile technology infrastructures has greater outreach than internet infrastructures. It means that mobile phone penetrate wider area, from urban to rural area. This extensive penetration will provide a better equal connectivity among citizen to government information and services.
c. The deployment of 3G and HSDPA network has enabled mobile device to access broadband data network and shifting some applications from PC to mobile devices.
d. The cost of mobile phone service is less than the cost of internet service. This has been a lesson learned from less developed countries where e-government deployment is constrained by financial limitation (Awotwi & Owusu, 2007; LIRNEasia, 2007)
e. Last but not least, one of the objectives of moving toward re-government is to extend government outreach to the citizens (Qureshi, 2005). Arguably, choosing a channel which provides greater outreach would be more desirable.

Our proposal for mobile government is based on previous studies on mobile e-government in Indonesia and other less developed countries such as:

- Wijaya and Surendro (2006) which suggested that readiness of both technological side and human side of government and citizens are essentials to the success of e-government. Their findings are in line with the government concern (Indonesia, 2003b).
- Susanto and Goodwin (2006) have proposed of model on how to provide e-government application using text message in mobile devices. We believe this supported our opinion that mobile devices are currently a better choice for delivering e-government services in Indonesia.
- Galpaya, Samarajiva, and Soysa (2007) suggested using phones (either mobile or cable) for extending e-government penetration.

If we looked at studies, currently we could not clearly identify the cause of the lack of success of web-based e-government. One might argue it could be caused by lack of internet access or by lack of readiness to engage in e-government effort. In coming years when the deployment of 3G/HSDPA network by Indonesian mobile operators expanded to all over Indonesia and

the completion of Palapa Ring project, we could observe and find the answer.

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KEY TERMS

3G: Or third generation of mobile phones, refers to the standard of mobile phone technology that enables to deliver high speed data, voice, and video access.

E-Democracy: Refers to the use of electronic channel (e-government) for democratic process such as public policy making and voting.

E-Goverment: Refers to the use of internet technology as a platform for exchanging information, providing services and transacting with citizens, businesses, and other arms of government. e-Government may be applied by the legislature, judiciary, or administration, in order to improve internal efficiency, the delivery of public services, or processes of democratic governance.

HSDPA: Or High Speed Downlink Packet Access, refers to data communication protocol

of 3G mobile phone network that enable high speed data transfer.

Instant Messaging: Refers to form of communication between two or more parties in a real time mode using text.

Mobile Government: Refers to the use of handheld or mobile communication devices to access and deliver e-government services.

Socio-Technical System: Consists of technical aspects (information and technology) and social aspects such as people, organization and environment of a system.

Web-Based e-Government: Refers to the use of internet-enabled devices (usually PCs) to access and deliver e-government services.

ENDNOTES

1 The index was a weighted average composite index of e-readiness based on website assessment; telecommunication infrastructure and human resource endowment.

2 Jogjakarta is a province consisted of 5 local governments. All but the local government of Gunung Kidul have developed their official web sites.

3 Since we coul not find data at provincial level, we used national level data as proxy of Jogjakarta's situation.