

An Assessment of Indonesian City's E-Government Websites: Adoption and Development

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Abstract: We take a look on the development of e-Government in Indonesian cities by making an assessment on adoption and functionalities of government websites. Based on review of e-Government functionality measurements and development stage model proposed by Huang [1] as well as other supporting literatures, we attempt on identifying the relationship between socioeconomic factors with adoption and diffusion of e-Government in Indonesia. Content analysis methodology is adopted to determine provided functionalities in the websites. Statistical analyses revealed that only few socioeconomic factors have significant relationship with adoption and diffusion of e-Government in Indonesian cities. We find that there is no support to significant relationship between those factors with e-Government adoption and diffusion in Indonesian cities.

Key words: e-Government • Content analysis • Local government • City government • Stage model • Socioeconomic • Indonesia • Huang

INTRODUCTION

Government agencies all over the world have utilized web sites as part of their e-Government initiatives. Indonesia also has adopted e-Government to support its national and local governments. There are many web sites of Indonesian local city governments which are developed as their official representation in the internet. The introduction of higher autonomy for local governments as the consequence of Regional Autonomy Act in 1999 has brought more significance to those local governments. There is a need to take a more active role in building relationships with stakeholders such as local people, business sectors and investors [2]. Unlike the development of e-commerce which is relatively more advanced, e-Government is still at its early stage of development. Indonesia with its relatively limited information technology infrastructure is even younger in utilizing e-Government web sites.

The development of e-Government in Indonesia is marked by several initiatives to bring Indonesia closer to international practice. Among one of those initiatives is

the establishment of a national strategy and policy on information and communication technology (ICT) through Development Strategy and Policy in Communication and Informatics [3]. E-Government was adopted officially into Indonesian public administration with the release of Presidential Directive number 6 in 2001 about Telematics. E-Government is adopted in Indonesia with aims of supporting changes toward democratic governance practices, balancing authority between central and local government as well as facilitating communication between the two parties, gaining openness and transforming into information society [4]. Another initiative is the establishment of coordinating team for ICT development as a task force in charge for implementing electronic media into government's internal function, interactions and transactions. One of the outputs from this task force is an ICT action plan to address issues on: reform policy and legal framework to support ICT and e-Government development, supporting human resources development, infrastructure development acceleration, application development, e-Government portals revitalization and

preparation as well as implementation of e-Government strategy and action plan at government offices and agencies [5].

Regardless these initiatives, the progress and development of e-Government in Indonesia are not balanced across its various administrative levels. Also Indonesia's e-Government readiness remains relatively the same over time based on the United Nations e-Government Survey in 2003, 2004, 2005 and 2008. In the last survey in 2008 Indonesia is ranked at position 106 of 192 countries compared to its position at previous years [6]. Several challenges that are found in implementation of e-Government in Indonesia include inadequate telecommunication infrastructure and capacity, insufficient sustained funding, lack of coordination and integration [5]. This conforms to other research finding that developments of e-Government websites by local governments often face lack of required technological expertise and experience as well as financial resources or budget [7, 8].

Problem Statement: Huang [1] introduced a stage-model of e-Government development, from information to communication, transaction and democracy. Therefore, it is interesting to find out how well Indonesian city government web sites are doing in e-Government development stages. We aimed to have an assessment of e-Government development in Indonesia, as how socioeconomic factors are related to adoption and diffusion. Specifically, the scope of the research is limited to Indonesian cities' e-Government websites; We order to find out the development in city's government level.

Research Questions: The research questions addressed in the present work are:

- What is the status of e-Government adoption by Indonesian cities and how are the socioeconomic factors related to the adoption status?
- What functions are provided by Indonesian city e-Government websites and how socioeconomic factors related to these functions?
- Does Indonesian city e-Government practice follow growth pattern of information, communication, transaction and democracy, as proposed by Huang [1]?

Literature Review

Motives behind e-Government: Information technology has been seen as a substantial role in improving public administration [9, 10]. This view is associated to

information technology ability that in the beginning more on presenting enhancement in operating efficiency and also improved internal communication [11]. With the existence of Internet, this internally oriented perception was shifted toward a more externally oriented which is on government's relationship with public [12]. Internet is responsible for making it possible for government offices and officials to communicate directly with people and to provide easy access to public information, in ways that is cost effective and user friendly [12]. On the side of public interest, the development of e-commerce and its impact in the way people exchange information and perform business brought new expectations toward the way government interact with people. The convenience and ease of e-commerce combined with the Internet enable people to get information and do business almost anywhere and anytime. This brings expectation to people that government should also be able to do the same in providing services and information. Government can utilize the Internet to develop communication channels and method of participation [13]. In this perspective, e-government is the solution to timely access to information and services through efficient and responsive process. This is referred as the change in relationship between government and everyone served by government, marking new paradigm on public service [9, 12].

e-Government Practices: Some researches provided descriptions of several e-government practices. Koh *et al.* [14] discover that e-government practice is mostly in early stage of development which mainly in presentation stage based on Gartner's four phases of E-Government model [15] or strategic level of readiness model [14]. While the use of website is mainly for distribution of information, however there is a tendency to implementation of advanced applications which enable transactions such as online payment. Nevertheless, a state of full integration is not yet commonly reached, where perfect and complete coordination and integration of both initiatives and database exist with the support of seamless data infrastructure. In the other hand, in terms of features and content, a research by West [16] mentioned about several areas that is mainly covered or provided by U.S. state and federal government websites, namely online services, mobile internet device support, security policy, foreign language support and disability access support. These aspects of e-government websites demonstrate increasing trend over years and considered as supporting factors to determine the quality of e-government websites.

e-Government Adoption and Diffusion as Innovation:

Several studies attempted to identify factors that influence e-government adoption and diffusion adopted some theories such as innovation diffusion theory [17], technology acceptance model [18], theory of economic growth [19] and regional development theory [20]. Technology acceptance model tries to explain user acceptance towards new technology by identifying two major factors which influences the level of acceptance, namely perceived usefulness and perceived ease of use [18]. Perceived usefulness refers to user's confidence that the new technology has positive impact as benefit of using it. On the other hand, perceived ease of use refers to the user's assurance that using such technology would not involve difficulty or require considerable amount of effort. In the case of e-government, this can be applied as how e-government adoption and diffusion is a function of citizen's perception as user on usefulness and ease of use of e-government.

Theory of economic growth focuses on determinants of economic growth, growth rates and its differences over time and space as well as factors influencing policies on improving growth rates [19]. It is differentiated into three different categories, namely classical growth theory, neoclassical growth theory and new growth theory. New growth theory is more relevant to explaining e-government development compared with classical growth theory. While classical growth theory limits growth determinants only to capital and human resource factors, new growth theory extends itself to technological progress and creativity [21]. New growth technology introduced the concept of knowledge based economy as well as the role of information and computer technology in growth. All those factors, knowledge, information and technology, contribute to process innovation which leads to progress. In terms of e-government development, this theory describes it as a function of technology development, policymaking and national strategy. Theory of economic growth also links e-government development with national economy performance.

Regional development theory can also explain the development of e-government [20, 22]. Regional development theory looks into influencing factors to regional growth as well as reason of difference in growth rates in various areas. These factors could sum up from politics, economics, technology, culture and environment factors. These factors vary between different regions therefore result on different outcome of development in many areas, including e-government. This theory can be

used to link contributing factors of e-government development with variation in regional factors mentioned above.

Finally, innovation diffusion theory describes diffusion process as how innovation is widely communicated over time throughout members of social systems [17]. In relation with e-government as a technology innovation, this theory can be used to explain how e-government is diffused into government and society. Following innovation diffusion theory, the adoption of innovation by organization follows two phases, namely adoption phase and diffusion phase [23]. The adoption phase is when the suitability of the innovation as well as user's acceptance toward the innovation goes through evaluation by the adopting organization. The next phase is diffusion phase after the innovation is well accepted by organization. In the diffusion phase, innovation is most likely to be modified, based on information gathered during adoption phase, to maximize its functionality. In order to be successful, an innovation has to be both fully adapted and diffusion. Only after full diffusion then an innovation can deliver its optimal functionality. In the case of e-government, the optimal functionality can be referred to the last stage in its development which is democracy stage [24].

Stages of e-Government Diffusion: Gartner [15] introduced four phases of e-government model, which consists of presentation, data exchange, transaction and sharing phases [15]. In the first level of presentation, e-government websites are mainly the mean of providing access to services. Its emphasis is the presentation of information, while access to more sophisticated applications or data is not yet significant. Presentation phase is followed by data exchange phase, where data can be exchanged automatically between different applications. This phase is characterized with the use of common data modelling and standard data definition architecture. However, the extent is not reaching end to end integration yet. The third phase is transaction, where data and process flows are consistently integrated across organizational boundaries, forming an end to end integration. Finally, there is the last phase of sharing, where end to end integration of data and process flow in transaction phase is even improved by sharing application components.

United Nation's report on UN member states progress in e-government describe a model of e-government development which consist of five stages,

namely emerging, enhanced, interactive, transactional and seamless. In the first stage of emerging, government websites are established with basic and static information. The following stage, enhanced, is marked by more updated information in e-government websites through regular process. Interactive is the third stage, where e-government website users have a degree of interactivity with the means of downloading forms, communicating with officials or making appointments and requests. Fourthly, e-government website users can make payments and other financial transactions online. Finally, in the utmost stage is the presence of total integration of functions and services across government organizational boundaries [25].

Norris and Moon [8] described an inclination of e-government websites from mainly informational towards more transactional, vertically and horizontally integrated and having portal-type attribute. In a related but more exhaustive approach, Koh and Balthazard [14] proposed a model of three categories of informational, transactional and operational uses to systematize the increasing features on the Internet. Informational uses are related to dissemination of information. Transactional uses are related to providing service and transferring value. Operational uses are related to incorporation of information system, human intellect and other resources which provides new ways of carrying on business. Koh and Balthazard stated that e-government adaptation follows an evolutionary path, with early stage focus on informational uses. It continues to develop to transactional uses by incorporating technology and integrating existing applications and databases (operational uses).

Musso *et al.* [7] in their study on 270 Californian municipal websites introduced a notional two-dimension framework of e-government reform. They stated that carrying out of e government promote “good management” and “good democracy”. Good management refers to entrepreneurial transformation dimension, while good democracy refers to participatory improvement dimension. In this perspective of two phase evolution of e-government, their study revealed that most of municipal websites are still at the first phase of entrepreneurial reform with focus on insubstantial information and communication capabilities rather than empowerment of society through more in depth substance. Huang [1] suggests that these adoption categorization is “vague, confusing and does not provide a prescription to the problem”. As an alternative, he constructed a hypothesis

from two preceding researches by Watson and Mundy [26] and Huang and Bwoma [24]. Watson and Mundy acknowledged that e-government is a constituent of electronic democracy, which provides necessary information about government to citizens. While Huang and Bwoma stated that e-government advancement follows four stages, information, communication, transaction and integration.

Four major stages of e-government development, which are stimulated by ideas from Howard [27] and Lau [28], set in motion with information stage where government make use of websites for providing information such as about public services, community and regulations to its constituents. It is followed by enhancement to communication stage where constituents can communicate with government through websites or email. The third stage is transaction stage where constituents have higher extent of contact through e-government, making it feasible to perform transactions such as tax payment online. The fourth and most difficult stage is integration stage where it is more service oriented with less prominence on respective government agencies or department. This stage is usually achieved by establishment of a portal as the single service way in [24]. Huang [1] (Figure 1) then argues that e-government’s absolute purpose is developing e-democracy to allow both efficiency and effectiveness in serving citizens. He made a proposition that the path of e-government diffusion follows a stage model of information, communication, transaction and democracy.

Factors Affecting e-Government Adoption and Development:

There are several researches which draw attention to factors that have an effect on adoption as well as development in e-government practices. For instance, two separate papers by Moon and Norris [8, 29] highlighted that city population size, nature of government; metropolitan prominence as well as region of the city is related with e-government adoption. In addition to those, occurrence of managerial innovative culture and its orientation are also considerable factors in e-government adoption at municipal level. E-government is developing slowly, to some extent due to barriers such as shortage of technical proficiency, not enough funding and lack of security features. Another finding by La Porte *et al.* [30] uncovers that national income as a function of wealth is a strong related factor with openness in e-government websites. Other factors, like country’s economic assimilation with global economy and

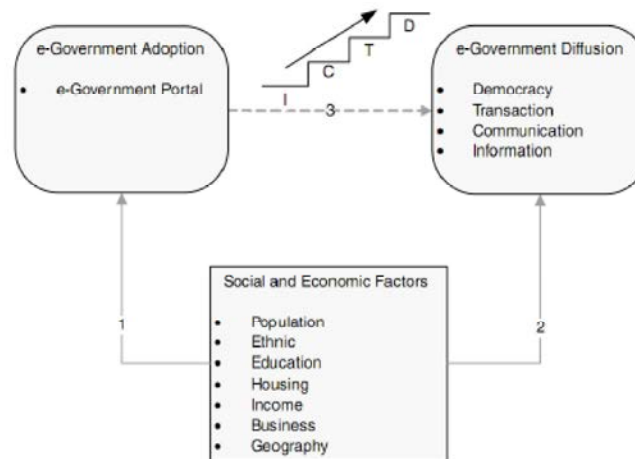


Fig. 1: Exploratory framework (Huang, 2007)

information technology diffusion in terms of the number of computer and internet hosts, both shows weak support to e-government openness.

Development status and region are found to be related with e-government development [22]. Their research also support proposition that income level is a factor in e-government development. Interestingly, a research by Reddick (2004) failed to find evidence that a factor that is traditionally associated to diffusion in technology such as wealth have significance in public sector e-commerce (Reddick 2004, in [1]).

Ho [12] found out that city size is associated to the innovation in e-government practices; with larger cities have a tendency to be more innovative than those of minor cities. Based on his study, he determined that larger cities have advantage of experiences and resources which results on improved e-government websites. He also proposed a hypothesis that city with lesser income and population is less likely to encompass good egovernment adoption as there might be less demand from public for web based services.

Musso *et al.* [7] carried out a study of relation between e-government adoption with several socioeconomic factors such as number of population, city government revenue and expenditure, percentage of college graduate, household's income and housing value. Their research provides statistical evidence of significant relationship between those factors and e-government adoption. These findings are supported by Huang [1] in his study on US counties e-government portals, which discovered that many socioeconomic factors do have significance to county's e-government adoption. However, Huang [1] found that population density and

federal government's support in form of federal funds and grants do not have significance to e-government adoption by US counties.

Research Framework and Hypothesis Statement: We adopted and adapted from previous research by Huang [1]. Huang analyzed U.S.' counties e-government adoption and functions using content analysis research methodology. City socioeconomic data is correlated to the overall scores to determine whether there are any significant differences in city websites based on these factors. The overall score is designed to be an overall assessment of the service and functionality of a city's e-Government portal. Independent t-test is performed to compare the means of each socioeconomic variable from each group of counties that adopt e-Government websites and do not adopt it. Multiple regression analysis is also carried on to discover what socioeconomic factors are correlated with the number of e-Government functions delivered by Indonesian city e-Government websites.

The list of all city governments in Republic of Indonesia was obtained from Department of Home Affair website (www.depdagri.go.id). Search string of "pemerintah kota" (city government) and "pemkot" (official abbreviation for city government) were used to start each city government website search. There are ninety one cities government throughout Indonesia, with a small exception for DKI (Daerah Khusus Ibukota or Capital Special District) Jakarta which makes the number of cities observed reduced to eighty seven. DKI Jakarta is actually a provincial government, which is a higher hierarchy of administrative division compared to city. Province of DKI Jakarta consists of five cities, namely

Table 1: Variable measurements

	Dependent variable
Number of e-government govGovernment functions	The level of diffusion of e-government website
	Independent variables
Population factors	Population, 2005 number of population from each city. (i) High school graduates, percentage of persons age 25+, 2005 $= \frac{\text{Number of high school graduates}}{\text{Number of population ages 25 and more}}$
Education factors	(ii) Bachelor's degree or higher, percentage of persons age 25+, 2005 $= \frac{\text{Number of bachelor degree graduate}}{\text{Number of population ages 25 and more}}$
Property factors	Property tax, 2005 = median value of housing unit as proxy for housing factors
Business factors	Central government funds, 2005 (Rp1000) = the amount of central government annual budget that is transferred to city governments as additional financing
Geography factors	Persons per square kilometre, 2005 $= \frac{\text{Number of city population}}{\text{City size in sq kilometre}}$

North, South, West, East and Central Jakarta. However, the constraint on obtaining detailed data for those cities at the time of research as well as the status of DKI Jakarta as a metropolis or big city [31], both were seen as proper justification to categorize DKI Jakarta as a city regardless its official provincial status. During the observation, several city government websites were found to be inaccessible for some reasons. The reasons ranged from web programming error (Pangkal Pinang) to inaccessible web server (Cirebon) and websites which were still under construction or maintenance (Surakarta).

Table 1 shows the variable measurements. Data that is used in this research is taken of year 2005 from several sources. There are so many cities in Indonesia; however this research looks for cities with government administration since e-government is associated with physical government administration. City of Jakarta is used in the place of smaller 5 cities, bringing total sample and population size to 87 cities. This research use snapshot data of 2005 for socioeconomic factors. As for the e-government function assessment in websites, this research takes snapshot data of circa July 2009.

Hypotheses:

- H1:** There is difference in the means of number of population between cities that adopt and cities that do not adopt e-government websites.
- H2** There is difference in the means of percentage of high school graduates from total number of population between cities that adopt and cities that do not adopt e-government websites.

- H3** There is difference in the means of percentage of bachelor degree graduates from total number of population between cities that adopt and cities that do not adopt e-government websites.
- H4** There is difference in the means of city's property tax income between cities that adopt and cities that do not adopt e-government websites.
- H5** There is difference in the means of amount of central government fund received between cities that adopt and cities that do not adopt e-government websites.
- H6** There is difference in the means of number of population per square kilometre between cities that adopt and cities that do not adopt e-government websites.
- H7** There is significant relationship between total number of e-government function in city government website with city's number of population, percentage of high school and bachelor degree graduate, property tax income, received central government fund and number of person per kilometre square.
- H8** The development of e-government diffusion do not follows a model of information, communication, transaction and democracy stages.

RESULT AND ANALYSIS

The t-test on 6 independent variables showed that most of independent variables evaluated in this research were not significantly different between the two groups of cities, those adopted e-Government website and those did

Table 2: T-test on group means of independent variables

	<i>Cities with e-government websites (n=78) mean</i>	<i>Cities without e-government websites (n=9) mean</i>	p-value
Population	553,186.58	178,964.44	0.309
High school graduate (%)	49.80%	53.49%	0.381
Bachelor's degree graduate (%)	8.93%	9.09%	0.911
Property tax (million)	Rp34,818.26	Rp9,186.09	0.530
Central government funds (billion)	Rp10,813.36	Rp5,346.67	0.264
Person per square kilometer	3,596.12	1,284.36	0.000

Table 3: Multiple regression analysis

	Unstandardized Coefficients	Standardized Coefficients	
	<i>B</i>	<i>Std.error</i>	<i>Beta</i>
Bachelor's degree graduate (%)	13.383	6.597	0.225
Central government funds	4.255E-5	0.000	0.255

Table 4: City e-Government websites information functionalities

Component	No	%
City mission/history/introduction	75	100.0%
City budget	30	40.0%
City news and events	73	97.3%
City offices/officials	60	80.0%
Education information	25	33.3%
Streets information	3	4.0%
Recreational sites	48	64.0%
Job opportunities	9	12.0%
Public works	0	0.0%
Garbage collection/recycling	0	0.0%
Planning information	10	13.3%
Static city maps	45	60.0%

Table 5: City e-Government websites communication functionalities

Components	No	%
Phone numbers of city offices/officials	29	38.7%
Email address of city offices/officials	15	20.0%
Form downloads	5	6.7%
Guestbook	48	64.0%
In-site search	46	61.3%
Interactive maps	4	5.3%
Links to past news or publications	31	41.3%
Access to city government's database	3	4.0%
Support for disabled people	0	0.0%
Multiple language version	8	10.7%
Online form for submitting complains	13	17.3%
Live broadcast of city council meetings	0	0.0%
Automatic notification on website content update	12	16.0%
Polling on website features	15	20.0%
Voter registration	0	0.0%
Forum/discussion groups	16	21.3%

Not (Table 2). The only independent variable that showed significant difference is person per square kilometers. Cities that adopted e-Government website had significantly higher number of person in each square kilometre than cities that did not adopted e-Government website. (3,596.12 versus 1,284.36).

Based on the multiple regression analysis in Table 3, There are two significant independent variables out of six variables included in this research, namely the percentage of population of bachelor degree graduate (p-value = 0.046) and the level of central government fund granted to the city (p-value = 0.024). Both of the significant independent variables are positively related to the number of e-Government function in city government websites.

e-Government Development Stages: The development of e-Government functionality is evaluated based on stages of information, communication, transaction and democracy. In each group of functionality, the number of city government website that adopts each measurement component is counted and the percentage is calculated.

Table 4 shows that in group of information functions, all websites (100%) provide brief introduction as well as information on city's history, vision and mission statements. There are even less website that provides information on planning (13.3%), job opportunities (12.0%) and city streets (4.0%). Lastly, there is even no website that provides information on ongoing public work and garbage collection.

Table 5 shows the category of communication and interactive functionality. It shows that there is significantly less number of websites compared in information functionality category. Guestbook is the most popular (64.0%) mode of communication available in city government websites. Measured communication functions that are not found in any of observed websites include disability support; city's meeting live webcast and online voter registration.

There is no transaction functionality support found in any observed city government websites (Table 6). In Table 7 shows that there is almost similar finding on democracy functions, with only very few numbers of websites provide election policies (5.3%) and election results (4.0%). One observed democracy function of online electorate forms cannot be found in any of city government websites. In overall Indonesian city government websites provide 42.00% of observed information functions. Accordingly, Indonesian city

Table 6: City e-Government websites transaction functionalities

Components	No	%
Personal records (birth, marriage, death)	0	0.0%
License and permit applications	0	0.0%
Ticket and fine payments	0	0.0%
Local city tax payments	0	0.0%
Utility payments	0	0.0%

Table 7: City e-Government websites democracy functionalities

Components	Number	Percentage
Election and voting policies	4	5.3%
Online electorate forms	0	0.0%
Election results	3	4.0%

government websites also provide 20.42% of observed communication functions and 3.11% of observed democracy functions. For the transaction stage, there is no e-Government function can be found in any of observed websites.

DISCUSSION

e-Government Websites Adoption: It seems that social economic factors are not relevant for Indonesian city governments in their decision to adopt e-Government websites. In the last decade, Indonesia's central government's started to recognize the need of change to cope with its efforts toward a fundamentally democratic, transparent government system. In its process toward such democratic state of governance, it is seen as an importance to maintain a good channel of communication. Better access to information regarding government administration is also a benefit of e-Government that Indonesian government seek from e-Government adoption. With e-Government, all stakeholders of Indonesian government such as citizens, business communities, or government agencies can optimally utilize related government information and services. This is achieved by the use of information technology to eliminate bureaucratic barriers and from an integrated process and management system to simplify access to those information and services. Presidential Instruction (INPRES) number 3 in 2003 is the statement of Indonesia's national policies and strategies for e-Government development. It is an instruction by the President of Republic of Indonesia to all heads of Indonesian government organization bodies, including mayors of cities, to take all necessary actions to support national development of e-Government under coordination of Minister of Communication and Information. Development (adoption) of government websites for each government organization, including city government, is one of the

action plans. Therefore, it can be understood that the adoption of e-Government websites by city governments in Indonesia is more of the consequence of central government regulation and policy, rather than a direct reaction to socioeconomic factors in each city.

Diffusion of e-Government Functions: There are only 2 out of 6 evaluated variables which show significant relationship with e-Government function diffusion. One of the significant variables (central government fund) has a very low regression coefficient, which means it has a weak relationship despite being a significant one. Every 10,000,000,000,000 Indonesian Rupiah is related with increase of 4.255 e-Government function, which is a very large amount of money for city government level. For comparison, Indonesia's state expenditure budget for the fiscal year of 2008 was only 989,500,000,000 Indonesian Rupiah. [32]. Only bachelor degree graduate population percentage remains with relatively both considerable and significant relationship with number of e- Government functions.

e-Government Diffusion Development Pattern: According to data findings, Indonesian city government websites mostly focused on providing information functions. While majority of websites provide information such city's introduction, history, news, events, recreational sites and static maps, these kind information have less value to know in detail how city government perform its duties compared to other information such as city budget. Nevertheless, less than half city government provide information on city budget. Good thing is that most websites provide information on city government offices and officials, facilitating citizens to get to know about who are in charge of certain area of government function. Another notable finding is most of provided information is more of static information (history, recreational sites and static maps), with the exception of city news and events. More dynamic information such as streets information, public works and garbage collection still miss adequate attention. This is room for further improvement of provided functions. However, this may require a support system of information that is capable of supplying needed information in adequate detail and reliability in timely manner [33]. Another possible explanation to this lack of dynamic information is the culture and perception of local city citizens which have not put internet and websites as their main source information for government related matters. This can be traced back to data finding that shows cities with higher

percentage of bachelor degree graduate tend to have more e-Government functions in their city government website. The second category of communication functions has less representation in Indonesian city government websites compared to information functions. This category is intended to see implementation of two-way communication compared to one-way communication of information functions category. The fact that guestbook is the most available communication function in observed websites brings concern that it is not the most direct method of communication with authorities in city government, compared with email or telephone communication for example. Other methods like providing city officials' telephone and email which will facilitate a more direct communication is only done by minority of observed websites. However, in some websites that provide online form for submitting complains it can be seen that this function is used effectively in two-way communication, as each complain submitted is responded. In overall, Indonesian city government websites have a lot to improve in providing communication functions. Most of the functions evaluated are provided although some of them only by a few websites. Examples of these less popular functions are form downloads, interactive maps and access to government database, which are adopted by less than 10% of observed websites. On the more advanced diffusion stage of transaction and democracy functions, it is not surprising to find that Indonesian city government websites still pretty much in very early stage. No transaction functionalities are provided by any of the observed websites and only few websites provide democracy supporting functions. This can be related to lack of proper integration and reliable database inside city government. While information technology adoption within organization of government is already a common thing, without proper integration to enable secure access from outside of government (such as websites) providing functions related with modifying personal or confidential information on websites can be quite risky. It is risky because confidential information is transmitted via open environment network of Internet. The security of this information should be guarded, especially on sensitive information such as personal data [22].

Comparison to Previous Researches: Previous researches in e-Government development have attempted to discover factors that can explain e-Government adoption and diffusion [1, 7, 12, 29, 34]. This research adopted those findings to assess e-Government adoption and diffusion

Table 8: Comparison of e-Government implementation level between Indonesian cities and US counties

Stages	Indonesian Cities (this research)	US countries (Huang, 2007)
Information	42.0%	51.9%
Communication	20.4%	29.6%
Transaction	0.0%	9.5%
Democracy	3.1%	40.8%

in terms of city government websites in Indonesia. Since lack of previous researches is done in Indonesia, it is interesting to compare the findings in this research with those of previous researches.

Further comparison of Indonesian city websites in this research with U.S. counties websites in Huang [1] research shows U.S. countries have reached higher stage in e-Government diffusion compared Indonesian cities (Table 4). The usage of similar measurement instrument in the two researches makes this comparison possible. In each stage of diffusion development, U.S. has higher implementation level compared to Indonesia. This finding also confirms with relative position between U.S. and Indonesia in United Nation's e-Government readiness index ranking. U.S. is ranked 4 in the world, while Indonesia is ranked 106 [6].

CONCLUSION

This research is an attempt to investigate the adoption and diffusion on e-Government in Indonesian cities, by looking at their government websites. Majority of Indonesian city governments have adopted e-Government websites, with 89.66% cities have adopted and 10.34% have not. In terms of diffusion, most of Indonesian cities are still in early stage of diffusion. It is also found based on several socioeconomic factors studied in this research that there is no support to significant relationship between those factors with e-Government adoption and diffusion in Indonesian cities. This is in contrary with findings in previous researches in e-Government. Development of e-Government diffusion in Indonesian cities follows a pattern of stages, from the most basic information stage, followed with communication, transaction and democracy stage. Most of cities are still in the early stage of diffusion. However, the e-Government diffusion development pattern in Indonesian cities follows a similar pattern of those from previous research on U.S. counties. The comparison of development pattern between the two countries is confirmed with their relative positions in United Nation's e-Government readiness assessment

ranking. This is an indicator that the e-Government instrument measurement proposed by Huang [1] can be used in e-Government development comparison study. The further research of additional factors from areas further than socioeconomic factors, such as technological know-how or authority system, is likely to obtain an enhanced model to explicate variations in e-Government adoption. Further research may look into broader scope which includes all local governments in Indonesia, both cities and regencies (kota and kabupaten). Such research can provide confirmation to this study and give a better snapshot analysis of overall e-Government practice by Indonesian local governments.

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