

## **Evaluating E-government Implementation by Local Government: Digital Divide in Internet Based Public Services in Indonesia**

**Budi Hermana<sup>1</sup>**

<sup>1</sup>Faculty of Economics, Gunadarma University  
Jalan Margonda Raya No. 100 Indonesia  
Email: [bhermana@staff.gunadarma.ac.id](mailto:bhermana@staff.gunadarma.ac.id)

**Widya Silfianti<sup>2</sup>**

<sup>2</sup>Faculty of Computer Science, Gunadarma University  
Jalan Margonda Raya No. 100 Indonesia  
Email: [wsilfi@staff.gunadarma.ac.id](mailto:wsilfi@staff.gunadarma.ac.id)

### **Abstract**

*The objective of this study is to evaluate the performance of public services through the website of local governments in Indonesia. Research variables are characteristic of web services, website popularity, and web metrics. Secondary and primary data are deployed to measure those variables. Data analysis focused on identifying the digital divide views from government levels and geographic location of Java and outside Java. Result finding show that on web metrics rank of local governments outside Java shows, website of province is more dominant than the city or county website, while for Java Island, the website of the district or the city is more dominant than the provincial web. Further it shows that the province is better than the district and city for a webpage and inbound links, while the city is better for the popularity. District is lower than the provincial and city for all web metrics. Finally it shows that there are digital divide between Java and outside Java for a webpage, inbound links and traffic.*

**Key Words:** characteristic of web services, website popularity, web metrics, digital divide, public services

### **1. Introduction**

Based on data from Ministry of Home Affair, the total area of Indonesia is 1,904,556 km<sup>2</sup>, which includes 17,504 islands. Government area covers 33 provinces, 349 districts, 91 municipalities, 5,263 sub-districts, 7,123 villages, and 62,806 special villages (Ministry of Home Affair Regulation No. 18 in 2005). Indonesia does not have complete database about the number of local governments that have implemented a web-based public services. The ministry of Home Affair has complete data only for provincial, district and city. It is a need then to build a complete database. The need also triggered by the big population of Indonesia which is 238,452,952 and place Indonesia to become the world's big four population. Wide-spread geographic conditions become a great challenge for the government and people of Indonesia in the era of globalization and information, especially how to connect the scattered parts of Indonesia Area with big population through information and communication technology- which is a type of technology that drives globalization.

As mentioned by Harijadi (2004), Indonesia ICTs vision is "to bring into reality a modern information society, prosperous and high competitive, with strong supported by ICT". To realized National ICTs Vision, the Government of Indonesia has established The Ministry of Communication and Information that has responsibility to coordinate, formulating, and dissemination of national policies and strategies for ICTs development, encouragement and stimulating the development of ICTs, increase the use of ICTs in everyday peoples' live activities, and supervise the implementation of the National ICTs policy and development in Indonesia. In accordance with The Ministry of Communication and Information, through Presidential Decree No. 5 of 2000, it has been established an Indonesia ICT Coordination Board- a national task force that served to increase the use of electronic media to facilitate the function of government, linkages, interactions, and transactions. The board also has responsibility in providing guidelines and recommendations on how to conduct ICT development in Indonesia, including E-government. Furthermore, in April 2001, the Indonesian government has issued Presidential Instruction No. 6 which provides guidelines for development and empowerment of ICT in society.

Presidential Instruction includes 75 programs or action plans which are classified into four categories: legal and policy frameworks, capacity building of human resources, infrastructure, and applications in government and private sector. The question is whether a national vision or action plan was successfully implemented in all local government in Indonesia? More ever, research finding by Silfianti, Suhendra, and Harmanto (2010) shows that various obstacles still faced by administration of local government websites in Indonesia. Are these problems caused by differences in features or characteristics of local government website? This study aims to evaluate the performance of public services through the website of local governments in Indonesia by using analysis of web service features, as well as identification of factors associated with the digital divide between regional and government level.

## **2. Theoretical Framework**

### **2.1 Feature and Role of E-government**

According to UN Global e-readiness Reports, s-government is the use of ICT and its implementation by the government to provide information and public services to the community. The purpose of the e-government is to provide an efficient management of government information to all citizens, giving better services to the community, and to empower people through access to information and participation in public decision making (Curtin, 2006). Timonen, O'Donnell, and Humphreys (2003) stated that e-government is clearly an important area of policy development and indeed has the potential to change the way in which the public sector operates, both internally and in relation to its customers. Ndou (2004) stated that the target of e-government encompasses four main groups: citizens, businesses, governments (other governments and public agencies) and employees. The electronic transactions and interactions between government and each group constitute the e-government web of relationships and the respective four main blocks of e-government, that are Government to Citizens (G2C), Government to Business (G2B), Government to Government (G2G), and Government to Employees (G2E). Damodaran, Nicholls, Henney (2005) argue that the principles of e-government need to be embedded into all local government processes, with clear relationships between services and initiatives and the e-government agenda.

Furthermore, to achieve the cultural and organizational change which is necessary for the benefits of e-government to be fully realized, resources need to be made available for educating both staff and citizens in the concepts of e-government. E-government is clearly an important area of policy development and indeed has the potential to change the way in which the public sector operated, both internally and in relation to its customers. In Ireland, e-government has been the focus of significant attention as its importance for the public service modernization programme as a whole has been recognized (Timonen, O'Donnell, and Humphreys, 2003). Cook (2004) has cited a report from the Momentum Research Group, sponsored by the National Information Consortium (NIC) which operates portals in several states, details the e-government needs, opinions, and preferences of 303 people and 103 businesses throughout the United States. In telephone interviews these two groups were asked many questions related to the use of government services, including their opinions about quality of service, confidence in results, funding for e-government, security of information, and whether they would like to find these services on state or local government Web sites. According to Damodaran et al (2005), there are also concerns about the impact of e-government on the 'digital divide' in society between those who have access to digital technologies and those who do not.

The problem of increased democratic participation requires that a substantial proportion of the community has direct access to e-government via the Internet. A digital divide in the community raises two issues. The first is the practical one that if local authorities provide services via Internet, they have to maintain dual systems: a conventional system for those not connected and an e-service for those who are, and the cost of maintaining two systems can be prohibitive. The second problem is one of democratic equity. If those who are connected can obtain a more efficient service via e-government than those who are not connected, those who have rely on mobile services or town hall and public library facilities are disadvantaged. Choudrie, Ghinea and Weerakkody (2004) have reported the results of an evaluative study of a cross-section of e-government portals from these three perspectives, using a common set of performance metrics and Web diagnostic engines. Results show that not only are there wide variations in the spectrum of information and services provided by these portals, but that significant work still needs to be undertaken in order to make the portals examples of 'best practice' e-government services.

## 2.2. E-government in Indonesia

Salahuddin and Rusli (2005) stated that the term e-government in Indonesia first introduced in the public service through the Presidential Instruction No. 6 / 2001 regarding information and communication technology. In the Decree was stated that the Indonesian government should use information and communication technology to support good governance. E-government development is an effort to build structures, systems, and efficient administration, effective, transparent and accountable. These efforts should be supported by human resources who have the ability, good management systems, process and control system. The main challenge in developing e-government lies in the non technical aspects, including planning. E-government development and its application in particular need to consider several factors that often become obstacles in developing countries.

These constraints are (a) digital divide, (b) differences in language and written characters, (c) coordination and policy, and (d) technical aspects such as: infrastructure, people's purchasing power for computers, human resources, costs for information technology, and so forth. According Harijadi and Satriya (2000), beyond a commitment to e-government, the Indonesian government still faces a number of challenges that might hinder the implementation of e-government, including (1) capacity insufficiency and expensive of telecommunications infrastructure; (2) The problem of funding sustainability of various initiatives on e-government, (3) Lack of coordination and integration, and (4) The process of finalizing a lot of various laws and regulations regarding e-commerce and e-government. The Indonesian government already has a road map for dealing with e-government which is composed of five phases: preparation, stage appearance, stage action, participation phase, and phase transformation. Apparently the stages in the road map adopted stage-stages proposed by Baum and Maio (2000). General view of the road map can be seen in figure below.

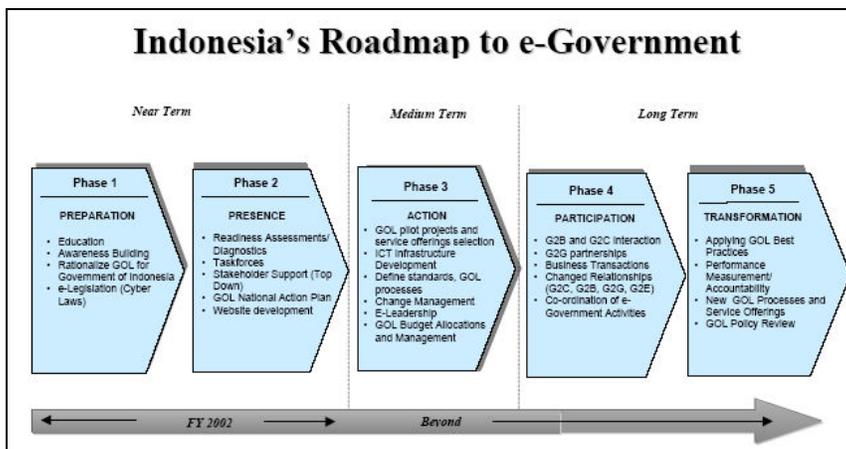


Figure.1. Indonesia Road map to E-government (Harijadi and Satriya, 2000)

Some of the action plan has been carried out by TKTI such issues as follows: (1) Reform policy and legal framework to support the development of ICT, including e-government, (2) Development of human resources capacity to support ICT and e-government; (3) Efforts to accelerate the development of infrastructure to support ICT and e-Gov applications through a national and international partnership; (4) Provide the development of a variety of useful applications for e-government; (5) e-government portal revitalization; (6) E-government strategy implementation, and (7) Prepare an action plan for e-government offices or agencies that are interconnected.

## 2.3. Measurement of E-government Performance

Stowers (2004) mentions two groups of e-government evaluation measures are (1) inputs, outputs and impact of e-government, and (2) measure of efficiency, service quality, and e-government activities. Examples of indicators for the first group are the number of documents downloaded, the number of pages on the internet sites that are accessible, and public trust in government that are known through the survey. Indicators for the second group are the number of meetings that can be watched online or by communities, response times to information requests, and the cost per transaction through the internet. Stower (2004) also stated that performance measurement indicators that are widely used today is seen from the frequency of use of e-government, such as the number of users, visitors, or site hits. Another type of measurement are (1) the size of web / technology that is more technical nature such as the number of web pages with problems or down time percentage of a website, and (2) service-based measures such as the level of adoption websites or the level of community satisfaction.

Freed (2009) states that the most successful website is able to serve the public to find information quickly and easily searchable. Many e-governments are responsible for managing and organizing a variety of information. Thus, the search function, functionality, and navigation become very important for the execution of those responsibilities. Kumar (2003) states that e-government, allowing greater public participation in politics and decision-making, something that can not be done in the past. Participation has increased the mutual trust between government and society and also among the public. This will create a sense of responsibility and the government becomes the real representative of the aspirations or interests of the community. Furthermore, it would increase transparency and accountability. According to Timonen, O'Donnell, and Humphreys (2003), e-government services is an important area of policy development, both internally and in touch with the community. Society-oriented services can be divided into two types: (a) services to companies who need the information through e-government and (b) society individually. Methods of e-government services to the company may be different for people who seek more information about education or welfare services.

According to Bertot, Jaeger, and McClure (2008), e-government users include (1) people who need services and information from government, (2) immigrants who need information about his new place, (3) government employees who use e-government in perform its functions, and (4) foreigner who need information about the country. Craycraft, DeStefano, and Smith stated that a website can store the past financial documents that can be used by investors as reference information. Website also provides an efficient, low-cost method to communicate the latest information on an ongoing basis to investors. The method can be used to (1) submitting the news about the various activities, (2) accelerate and expand the current distribution of public information, (3) reduce the question of investors, and (4) meet investor demand for disclosure of information quickly accessible at low cost . Cook (2004) states that the development of e-government is basically a change in the way of interaction between government and communities and companies. Some results of the survey in the United States showed that people require the services of government websites include maintenance of a driver's license, voter registration, information on city parks; election via the Internet; one-stop government services; request for various kinds of certificates like birth, death and marriage; tax filing, and access to health services information.

According to Rocheleau and Wu (2005), the biggest challenge of e-government applications is to allow the public or other users to perform financial transactions with the government related to the 24 hours per day, 7 days per week. The research indicates that online financial transactions continue to be offered as a promise in the future, although its success is not easy and still takes time. Rocheleau, and Wu (2005) argued that the penetration rate of payment via the web from most government applications is still low. Web utilization rate is influenced by many factors that can not be controlled by the government, such as socio economic status of the population and the level of internet connectivity in the region. One factor that can be controlled by the government is the nature of government websites, such as the level of visibility and ease of access and usage of online payment system. DeStefano and Smith mentions that one of special services from e-government is dissemination of financial information needed by residents, employees, suppliers or investors of securities issued by government. Investors, analysts, and Securities and Exchange Commission (SEC) recommended the use of Web for financial disclosure. They believe that web is the best way to provide financial disclosure for reporting on the internet will increase transparency, liquidity and efficiency in capital market. According to Welch and Hinnant (2003), the use of the Internet shows a positive correlation with the level of satisfaction with transparency, and transparency, simultaneously with the satisfaction of interactivity are positively related to public trust in government.

**3. Methodology**

Research design is an exploratory study to identify the digital divide in Internet-based public service delivery by local governments in Indonesia. Objects of research are the websites of the provincial governments, district governments, and the city where the website address. Lists of those websites are obtained from Ministry of Home Affairs. Number of local government websites are as many as 181 websites with details can be seen in the table below.

Table 1. Samples of Local Government Website

No.	Government Level	Format URL address	Number
1.	Province	<a href="http://nameiprov.go.id">http://nameiprov.go.id</a>	32
2.	City	<a href="http://citynamekota.go.id">http://citynamekota.go.id</a>	42
3.	District	<a href="http://districtnamekab.go.id">http://districtnamekab.go.id</a>	107

Each website is observed and evaluated using research instruments to measure service performance of local government websites. Research variables included three groups: characteristic of web services, website popularity, and web metrics. Indicators of internet based public services consists of news and events, FAQs, promotion of local potentials, e-procurement, sitemap, and other features of internet based public services delivered by local government. Popularity is measured by traffic analysis based on the query results obtained from www.alexa.com, while web metrics analysis consists of three variables: the number of web pages indexed by Google, the number of files tracked by Google, and inbound links indexed in Yahoo. Data analysis focused on identifying the digital divide views from government levels and geographic location of Java and outside Java

## 4. Results and Discussion

### 4.1. Internet-Based Public Service Features

Data was collected on March 26, 2010. There were 181 local government websites in at that time, in which as many as 150 local government webs or approximately 82.9% can be accessed. Another 17.1% or 31 local government webs cannot be accessed on the day data was retrieved. Out of 181 local government websites, 32 webs are categorized as province webs, 109 as web districts and 40 as city webs. From local government webs, 99 webs or about 54.75% are outside Java Island. Although Java Island is the smallest among five (5) big islands, it has almost 50% local government webs. It shows that Java Island more advanced in technology and modernization.

Based on the content, it shows most of webs (98.7%) provide information, followed by news (97.3%), and organization profile (73.3%). From the availability of Frequently Answer and Question (FAQ), 94.7% of webs do not provide. Map mostly important to citizens, but only 74.7% webs occupied with map. In order to rise earning from tourists, promotion is also very important for local government. But again, only 64.1% provide promotion. Complete description about the features of website is shown on Figure 2.

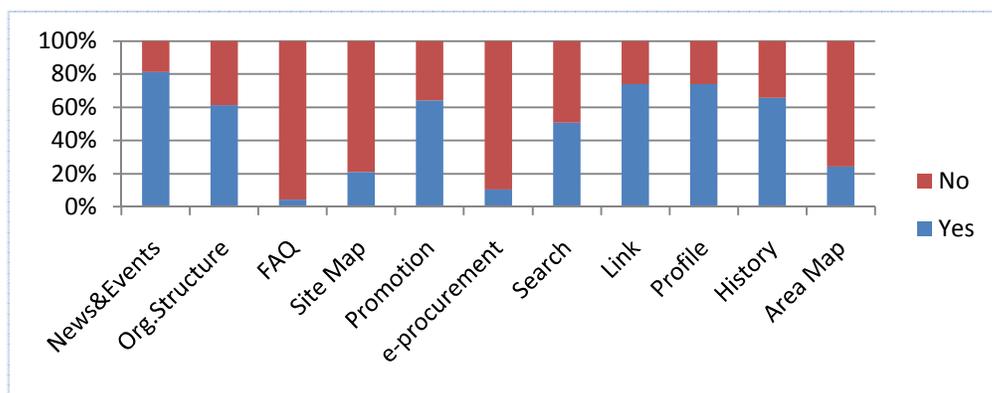


Figure 2. Evaluation of website feature

Website of local government has not provided good service for the four types of services: the FAQ, e-procurement, site, and location maps. All four types of those services are indeed very important for public service in the information age. This condition also shows that local government has not utilized public services through the website optimally. According to a road map of e-government development, as was quoted by Harijadi and Satriya (2000), this findings could also mean that e-government development has only reached the medium-term or third stage. There is few of local government that has reached the stage of public participation or phase 4 in which one of its services are business transactions and interactions with the community. Even using a model proposed by Baum and Maio (2000), quoted by As-Saber, Sharif, Srivastava, and Hossain (2006), the use of websites by local government in Indonesia has only reached a stage of presence in e-government model. Characteristics of e-government development at this stage are not complex, lower development costs and the short time horizon of development.

### 4.2. Information Richness and Popularity

The number of webpage range from 101 to 1.61 million as calculated by Google search engine. Inbound links ranges from 0 up to 4.38 million. Document Richness ranges from 0 to 28.200 with an average of 635 documents. Website popularity measured based on traffic ratings at www.alexa.com ranges from 1,009 to 100,209.

There are 81 websites that do not have ratings yet on alexa.com. From this fact it can be concluded that 81 websites have very less visitors. We listed top ten for each characteristic as can be seen on Table 2.

Table 2. Listing top ten of websites for four characteristics

Rank	Size	Inbound Link	Document	Traffic
1	Prov. Kalteng	Kab. Bone	Prov.DKI Jakarta	Kota Jaksel
2	Kota Tomohon	Prov. DKI Jakarta	Kota Jaktim	Kota Jaktim
3	Prov. Jateng	Prov. Papua	Kota Jakbar	Kota Jakut
4	Prov. Papua	Kota Jakpus	Kota Jakpus	Prov. DKI Jakarta
5	Kab. Kebumen	Kota Jakbar	Kota Jakut	Kota Jakbar
6	Kota Bontang	Kota Jaktim	Kab. bone	Kota Jakpus
7	Kota Bandung	Kota Jaksel	Kab. Sumenep	Prov. Jabar
8	Provinsi Jatim	Kota Jakut	Prov.Papua	Kota Bandung
9	Kota Yogyakarta	Kota Surabaya	Kota Jaksel	Kota Balikpapan
10	Prov. Jabar	Kota Bandung	Kota Bandung	Prov. Jatim

Seven cities included in the top ten for inbound links and traffic and six cities in documents richness. Inbound links and traffic is a measure of website popularity. So these findings indicate that the website of the city visited most and referred by other websites is DKI Jakarta. One driving factor is the number of people who have a high internet-literate in the city more than in the district, as well as the availability of internet connection that was prevalent in major cities in Indonesia. In general, Indonesia still faces obstacles in the Internet connection which can reach all parts of Indonesia. And this is related to Indonesian ICT penetration rates that are still lower than the average of the ASEAN, Asia, and the World (Hermana, 2008). The Indonesian Ministry of Communication and Information has conducted a study on the readiness of e-government implementation in Indonesia. The results revealed that still needed more attempts to enhance Indonesia’s e-readiness. For example, telecommunication infrastructure was an important utility where the community could access e-government services.

**4.3. Digital Divide between Government Levels**

One of the political decisions in an era of reform that occurred in Indonesia after 1998 is the policy of decentralization or regional autonomy, which gives broader authority to local governments compared to the previous political regime. Based on Law No. 22/1999 about local government, regional autonomy is given to the district or city level. The policy puts the district or city became a central point in the delivery of services to the community by local governments. Regional autonomy led to differences between districts and provinces/cities in providing public services, but the differences were not significant, except for outside of Java.

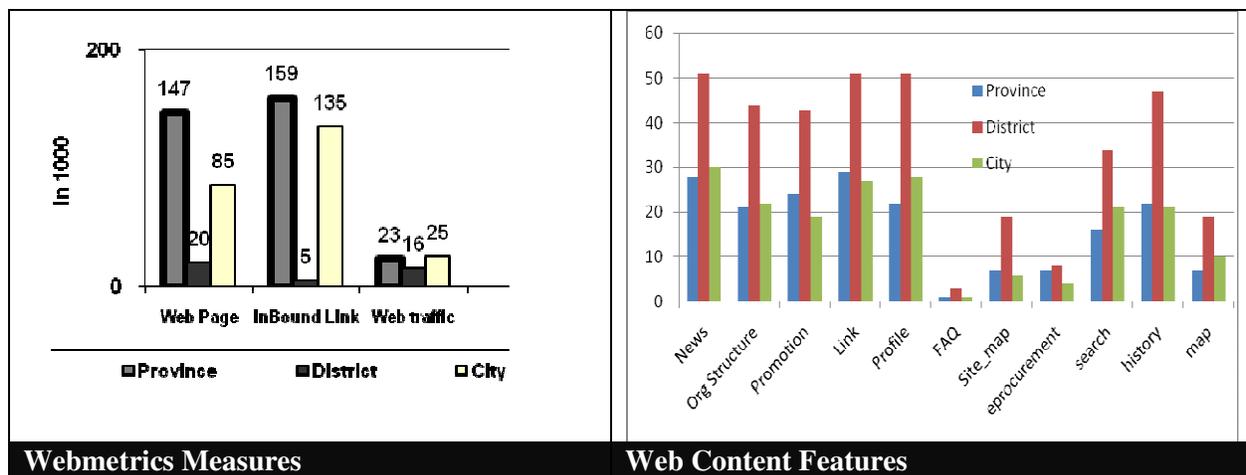


Figure 3. Web metrics of province, district, and city

Web metrics rank variable for local governments in outside Java shows that the website of province is more dominant than the city or county website, while for Java Island, the website of the district or the city is more dominant than the provincial web. These facts are very interesting and could be a signal that the policy of decentralization in the field of website administration more successfully done by district and cities in Java Island.

This study supports the research results of Satriya and Harijadi (2000) which states that Indonesia is still facing various constraints in implementing e-government. One of the factors that cause this condition is the low competence of human resources, especially the ability in the development and maintenance of website as well as the lack of telecommunication infrastructure that has not reached all parts of Indonesia. Comparison of webpage, inbound links and popularity as well as the completeness of the content feature viewed from the level of government is seen on Figure 3. The figure above shows that the province is better than the district and city for a webpage and inbound links, while the city is better for the popularity. District is lower than the provincial and city for all web metrics variables. The higher public information on the website of the province due to the status of the province who supervises a number of counties and cities. So the provincial government has the information resources that larger than the district and cities. However, these factors still depend on the productivity of the updating of website content by the web administrator. Research results of Silfianti, et al (2010) showed that web productivity of the provinces website in outside Java is higher than the province in Java Island.

**4.3. Digital Divide between Java and Outside Java**

Java and outside Java dichotomy is one sensitive issue that is still heard in the political and economic sphere in Indonesia. National development and economic activity is more concentrated in Java Island. One effect of these conditions is the lack of communications network infrastructure which is needed in Internet-based public service. The dominance of the provincial website also indicates that the telecommunications infrastructure network is not up to the entire region, or only reached the big cities that became capital of the province in outside Java.

Figure 4 indicates that there are digital divide between Java and outside Java for a webpage, inbound links and traffic. Digital divide can be caused by several factors, among which is the telecommunication infrastructure as noted in the research results conducted by the Ministry of Information and Communications as well as ICT penetration rates by the community of outside Java. Popularity, as measured by the inbound link and traffic, show people's participation in visiting the website. This could be due to low ICT penetration level or narrow scope of the public information that available in website. These conditions require the attention of the government to improve the function and role of e-government in Indonesia to run more smoothly. According to Schwester (2009), e-government initially began as process where government entities developed websites and began populating these sites with information. Political support is a key and fairly robust determinant of municipal e-government adoption as well. One effort that can be done by local government is to create an information society in order to encourage the adoption of local government websites by society. Referring to the research model by Kumar et.al (2007), the adoption of e-government websites influenced by user characteristics, design websites, and the level of satisfaction from visitors of the website.

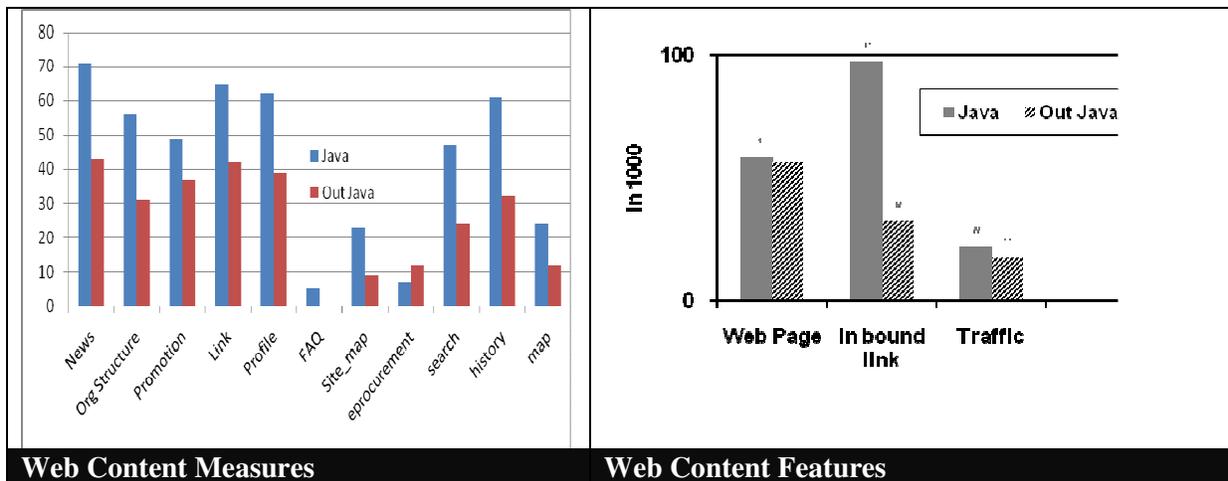


Figure 4. Web content measures and features between Java and Out side Java

**5. Summary and Suggestion**

As summary, we can state that web metrics rank of local governments outside Java shows that the website of province is more dominant than the city or county website, while for Java Island, the website of the district or the city is more dominant than the provincial web.

Compare among government level, province website is better than the district and city for a webpage and inbound links, while the city is better for the popularity. District is lower than the provincial and city for all web metrics variables. As a whole we can conclude that there are digital divide between Java and outside Java for a webpage, inbound links and traffic. Digital divide can be caused by several factors, among which is the telecommunication infrastructure as noted in the research results conducted by the Ministry of Information and Communications as well as ICT penetration rates by the community of outside Java. These conditions require the attention of the government to improve the function and role of e-government in Indonesia to run more smoothly. Political support is a key and fairly robust determinant of municipal e-government adoption as well. One effort that can be done by local government is to create an information society in order to encourage the adoption of local government websites by society.

## **References**

- As-Saber, Sharif N, A. Srivastava, & K. Hossain. (2006). *Information Technology Law and E-government: A Developing Country Perspective*. Conference on the practice of e-government and e-governance organised by Monash University in June 2006.
- Baum, C., & A. D. Maio. (2000). *Gartner's four phases of e-government model*. Gartner Group Inc., Stamford.
- Bertot, J.C, P.T Jaeger, C.R McClure. (2008). *Citizen-centered E-government Services: Benefits, Costs, and Research Need*. The Proceedings of the 9th Annual International Digital Government Research Conference: 137-142. Montreal, Canada, May 18-21.
- Choudrie, Ghinea & Weerakkody. (2004). *Evaluating Global e-Government Sites: A View using Web Diagnostic Tools*. Electronic Journal of e-Government, ISSN 1479-439X.
- Cook, M.E. (2000). *What Citizen Want From E-government*. Center for Technology in Government University at Albany.
- Curtin, Gregory G. (2006). *Issues and Challenges Global E-government/E-Participation Models, measurement and Methodology A Framework for Moving Forward*. Prepared for the United Nations Department of Administration and Development Management, Workshop on E-Participation and E-government: Understanding the Present and Creating the Future, Budapest, Hungary, 27-28 July 2006.
- Damodaran, John Nicholls, Alan Henney. (2005). *The Contribution of Sociotechnical Systems Thinking to the Effective Adoption of e-Government and the Enhancement of Democracy*, Electronic Journal of e-Government, ISSN 1479-439X..
- Harijadi, D.A. & E. Satriya. (2000). *E-government's Road Map To E-government: Opportunities And Challenges*. Paper presented at APEC High-Level Symposium on e-government, Seoul, Korea, July 2-5, 2000.
- Hermana, Budi. (2008). *Teknologi Informasi dan Komunikasi di Negara-Negara Asia: Hubungannya dengan Variabel Ekonomi Makro dan Pengembangan Sumber Daya Manusia*. Universitas Gunadarma.
- Kumar, A. (2003). *E-government and Efficiency, Accountability and Transparency*. The Electronic Journal on Information System in Developing Countries Vol.12, No. 2, pp. 1-5.
- Kumar, Mukerji, Butt, and Persaud. (2007). *Factors for Successful e-government Adoption: a Conceptual Framework*. The Electronic Journal of e-government Volume 5 Issue 1, pp 63 – 76.
- Ministry of Communication and Information. [http:// www.depkominfo.go.id](http://www.depkominfo.go.id), accessed at 9 April 2010.
- Ministry of Home Affair. <http://www.depdagri.go.id>, accessed at 27 Maret 2010.
- Schwester, Richard. (2009). *Examining the Barriers to e-government Adoption*. Electronic Journal of e-government Volume 7 Issue 1 (113-122).
- Stowers, G.N.L. (2004). *Measuring the Performance of E-government*. IBM Center for The Business Government.
- Salahuddin, M., and A. Rusli. (2005). *Information Systems Planning For E-government In Indonesia*. The Second International Conference on Innovations in Information Technology (IIT'05).
- Silfianti, W., A. Suhendra, and S. Harmanto. (2010). *Performance Evaluation of Indonesian Local Government Website : Analysis of Web Content, Traffic and Webmetric*. Global Management Conference, Bali, 2010.
- Timonen, V., O. O'Donnell, and P.C. Humphreys. (2003). *E-government and The Decentralisation of Service Delivery*. Institute of Public Administration
- Welch, E.W., C.C Hinnant. (2003). *Internet use, Transparency and Interactivity Effects on Trust in Government*. Proceeding of the 36<sup>th</sup> International Conference on Systems Sciences.