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Qualitative Investigation of Digital Divide: Toward a Comprehensive Framework

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Qualitative Investigation of Digital Divide in Indonesia:
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Abstract

The issue of digital divide has attracted many researchers for over a decade, yet the understanding of digital divide is not comprehensive. This research examines three commonly recognised orders of the digital divide, which are: economic divide, the inequality of access to ICT associated with economic conditions; access divide, the disparity of access to ICT; and capability divide, the inequality of ability in using ICT, while conceptualising a fourth divide, innovativeness divide, which is defined as the disparity of individual's willingness to try out any new information technology. The paper presents a tentative model based on extensive literature review which was explored using qualitative method. The findings generate new insights into the relationships among those four orders of digital divide which contribute to the theoretical framework to understand the digital divide more comprehensively and provide evidence on the impact of digital divide on e-government use. Implications for theory and practice are also discussed in this paper.

Keywords

Digital divide, e-government, Indonesia, qualitative research

INTRODUCTION

The phenomenon of digital divide has been one of the most fruitful topics for many researchers and policy makers since the late 1990s, because all countries worldwide experience it to some extent. Even the most developed country, United States for instance, is inevitably facing the problem of digital divide or digital inequality (Mossberger et al. 2008; Venkatesh and Morris 2000). Considering the importance of information and communication technology (ICT) nowadays, attempts are made to understand and explain this phenomenon. Initially, digital divide was defined as the inequality between those who had access to ICT and those who had not (De Haan 2004; DiMaggio et al. 2001). Policy makers in many countries used such definition as the basis to increase public access to computers and basic ICTs in schools and other public places. In US, former President Bill Clinton proposed a tax incentive for business to donate computers to poor schools and communities (Lacey 2000). Some corporations worldwide also initiated a home-computer benefit for their employees who did not own computers (Atewell 2001).

Despite the policies and efforts to close the access gap, the UN indicates that the digital divide is not diminishing rather it is growing wider (UN 2010). Some scholars argued that this was a result of incomprehensive understanding of digital divide which led to insufficient policy. Therefore, Dewan and Riggins (2005) suggested two orders of digital divide; the first order was the access divide, while the second order was the ability divide, which was an inequality of ability to use ICT among those who already had access. Wei et.al. (2010) asserted a third order of digital divide, the outcome divide, which was an inequality of outcomes of exploiting ICT resulted from the first and second order of digital divide. Table 1 below presents some important researches on digital divide. The table, which not a complete lists, shows that most of the previous researches on digital divide had focused on access to ICT and demographic characteristics. The last column of Table 1 presents key findings from the respective research.

This research aimed to explore and extend the tentative research model for digital divide and its impact on e-government use. This paper is divided into six sections, in following manner: introduction; theoretical background; research method; research findings; discussion, which is written in integration with suggestions for future research directions; and finally, research conclusions.

THEORETICAL FRAMEWORK

In order to understand more comprehensively, this research explored digital divide beyond access and demographic factors. In this research, digital divide was defined as an inequality between individuals, households, businesses and geographic areas at different socio-economic levels with regard to both their

opportunities to access information and communication technologies (ICTs) and their use for a wide variety of activities (OECD 2001). It is a comprehensive definition covering all important elements of digital divide, which are demographic factors, socio-economic levels, access to ICTs and the use of ICTs. Based on the definition, a more comprehensive understanding of digital divide was proposed by categorizing it into four orders, namely economic divide, access divide, capability divide and innovativeness divide.

Table 1. Some previous researches on digital divide

Research	Variables of digital divide	Location	Key findings
(Sipior et al. 2011)	Age; education level; employment status; household income; internet experience	USA	Education, employment and income and perceived ease of use are the most significant factors for t-government use.
(Wei et al. 2010)	Digital access divide; digital capability divide; digital outcome divide	Singapore	Digital access divide impacts computer self-efficacy. Gender also significantly influencing computer self-efficacy.
(Schleife 2010)	County type; age; gender; education; occupational status; income	Germany	Education, age, income and county type are the most important determinants of internet use.
(Belanger and Carter 2009)	Access; computer and internet skill; gender	USA	Income, education, age, internet usage and online information search are significant predictors of e-government use.
(Hsieh et al. 2008; Hsieh et al. 2009)	Household income; education level; age; gender; ethnic group	USA	Internet PC ownership and personal network exposure in social-economically advantaged group are more significantly influencing continued use intention.
(Dewan et al. 2009)	ICT infrastructures	Cross country	Co-diffusion effects between PC and internet are complementary. Impacts of PCs on internet diffusion are stronger in developing countries than developed countries.
(Agarwal et al. 2009)	Gender; age; education; race; housing density	USA	All of the independent variables influence internet use. By controlling individual and regional characteristics, peer effects have stronger influence.
(Billon et al. 2009)	ICT infrastructures; GDP per capita; population	Cross country	In developed countries, GDP and education are the important factors influencing ICT adoption, while age and urban population are influencing ICT adoption in developing countries.
(Stern et al. 2009)	Access divide; proficiency divide; demographic	USA	There is access divide based on county type. Proficiency is influenced by type of connection.
(Mossberger et al. 2006)	Income; education; race; place of residence	USA	Disparities among ethnic groups are due to place effects rather than race. Concentrated poverty important for computer and internet access.
(Dewan et al. 2005)	Economic; demographic; environmental; IT penetration	Cross country	National income is positively associated with IT penetration. There are differences of demographic and economic effects.
(Mariscal 2005)	GDP per capita; urban population; privatization; autonomous regulator; IT penetration	Latin-American countries	All of the independent variables are significantly impacting IT penetration.
(Quibra et al. 2003)	Income; population size; education; ICT infrastructures	Asian countries	Income, education and infrastructures are determinants of ICT adoption.
(Dijk and Hacker 2003)	Age; gender; education; ethnic group;	Netherland	Age and gender determine PC possession.
(Kuk 2002)	Internet access	United Kingdom	Quality of local government websites in regions of low household internet access is poorer that in regions of high internet access.

Economic Divide

Socio-economic factors are believed as internal and external resources that together shape experiences, opportunities and even ways in which the world is viewed (Williams 1990). Socio-economic factors also substantially bring about a synergy of social and economic forces to individuals and resources contained in their surrounding environments (Hsieh et al. 2008). Hence, socio-economic has been associated with behavioural patterns in many fields, including psychology and information systems. In the field of information systems, prior researchers found that socio-economic condition influenced the ICT use (Agarwal et al. 2009; Mossberger et al.

2006; Schleife 2010) and that economic condition was the most important factor to widen the opportunity for accessing the ICTs (Dewan et al. 2005; Quibra et al. 2003).

Access Divide

Access divide represents the disparity of distribution of information and communication technology (Quibra et al. 2003). As mentioned earlier, most of the researches in digital divide focused on access divide as the dependent variable to ICT use (Table 1). Those who have examined access divide and its influence on ICT use suggested that the access to ICT was a key factor of ICT use. According to the framework provided by Dewan and Riggins (2005), access divide is considered as the first order of digital divide, because access to ICT is the primary requirement to ICT use. Dewan and Riggins (2005) and Wei et al. (2010) also found that access divide had significantly influenced capability divide.

Capability Divide

Based on Dewan and Riggins' framework and Social Cognitive Theory, Wei et al. (2010) developed a more comprehensive model for digital divide to include capability divide. Capability divide is then considered as the second order of digital divide (Dewan and Riggins 2005; Wei et al. 2010). Digital capability divide itself is derived from social cognitive theory (Bandura 1977), which argues that individual possesses a self-belief system. This system allows each individual to control his/her cognitive processes, feelings, motivation and behaviour (Bandura 1977), with self-efficacy being the key of the system. Self-efficacy refers to an individual's belief in his or her capability to perform a specific task, which may not necessarily reflect actual competence.

Although Bandura originally developed the self-efficacy theory for treating severely phobic, researchers in other areas including information systems have used the concept widely. In the area of information systems, computer self-efficacy has been examined by previous research (Compeau et al. 1999; Marakas et al. 1998; Wei et al. 2010). The results suggested that self-efficacy was a strong predictor of behaviour and attitudes. On the other hand, other researchers (Burkhardt and Brass 1990; Ellen et al. 1991) found that self-efficacy was one of the key factors of personal innovativeness.

Innovativeness Divide

The innovativeness divide refers to the willingness to change and try out any new information technology (Agarwal and Prasad 1998; Hurt et al. 1977). Innovation, by its nature, is associated with greater risks and uncertainty (Kirton 1976). As new technological innovation is introduced, potential users will consider perceived benefits as well as perceived risks or costs. Technological innovations will be adopted if the benefits earned by its users exceed the risks or costs (Ellen et al. 1991). Similarly, Rogers (1995) believed that innovators and early adopters were individuals who were able to cope with high level of risks and uncertainty. With regards to attitude toward new technology, Dijk and Hacker (2003) admitted that information *want-not* was a more important problem than information *have-not*. Hofstede (1983; 2009) found that in Indonesia as well as most of Asian countries, levels of 'uncertainty avoidance' index, the society's tolerance for uncertainty and ambiguity, were generally high. Consequently, Indonesians did not easily accept any changes and innovations.

In this research, Personal Innovativeness was used to explain the influence of innovativeness divide on IT usage. Rogers (1995) argued that individuals were categorized as 'innovative', if they were early to adopt an innovation and 'non-innovative' if they adopted later. Based on the research by Midgley and Dowling (1978) and Flynn and Goldsmith (1993), Agarwal and Prasad (1998) suggested that personal innovativeness was an important construct in the acceptance of information technology innovations. Figure 1 describes the tentative research model proposed in this research.

E-Government Use

This research intends to explore the phenomenon of digital divide in e-government context, based on two reasons: *first*, digital divide is one of the serious problems in implementing e-government systems (Harijadi 2004; Hwang and Syamsuddin 2008; UN 2010). Unlike e-commerce, where the businesses are allowed to choose customers, e-government systems are developed to serve the entire population (Carter and Belanger 2005). Therefore, the existence of digital divide is a big challenge for e-government. *Second*, understanding of this issue is important for government in order to develop 'citizen-centred' e-government systems and improve citizens' readiness for e-government. Table 2 presents e-Government Readiness Index of Indonesia in comparison with some Asian countries (UN 2005; 2008; 2010). The indices and ranks of Indonesia do not show a significant progress, which indicate that Indonesia's e-government systems face substantial problems.

Table 2. UN e-Government Readiness Index of some Asian countries

Countries/Region	2005		2008		2010	
	Rank	Index	Rank	Index	Rank	Index
Republic of Korea	5	0.873	6	0.832	1	0.879
Singapore	7	0.850	23	0.701	11	0.748
Malaysia	43	0.571	34	0.606	32	0.610
Vietnam	105	0.364	91	0.456	90	0.445
Indonesia	96	0.382	106	0.411	109	0.403

E-Government refers to the use of information and communication technology (ICTs) to enhance the access to and delivery of all facets of government services and operations for the benefit of citizens, business, employees and other stakeholders (Srivastava and Teo 2007). E-government system is an important tool for human development and for the achievement of development goals, such as Millennium Development Goals (MDGs) (UN 2010). Therefore, all countries are encouraged to implement e-government system. Applying e-government system is not simply transferring the system from one country to another-mostly from developed to developing country-as additional efforts are needed in implementing e-government system in a developing country (Schuppan 2009). As the primary stakeholder in e-government systems, citizens play a substantial role in e-government success (Davison et al. 2005). Citizens' usage of e-government is vital for e-government success.
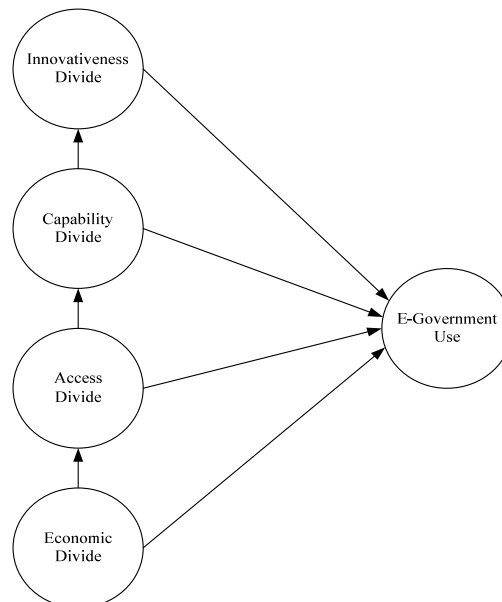

Figure 1. Tentative Research Model

Indonesia has established its e-government since 2001 through the Presidential Directive No. 6/2001 (Harijadi and Satriya 2000). Most local governments in Indonesia implement electronic system for its internal processes (G2G-Government to Government and G2E-Government to Employees). Some local governments, departments and government agencies provide website to interact with their stakeholders (G2C-Government to Citizens and G2B-Government to Businesses). Another form of e-government is one stop service, also called by some organizations as 'one-roof service'. One stop service is an integrated service provided by an umbrella organization, which operates on top of functional government agencies in order to improve the convenience and satisfaction of users (Ho 2002).

RESEARCH METHOD

This research examined the phenomenon of digital divide using a tentative model rather than predicted future actions. Researchers applied qualitative method by conducting one-to-one and face-to-face semi-structured interviews with 12 informants who previously used e-government system in Indonesia. The qualitative method is suitable in exploring and capturing reality in detail, especially when the experiences of the actors are important (Chan and Ngai 2007). Profiles of the 12 informants were presented in Table 3.

The research took place in two regions (Sleman District and Tulungagung District). Preliminary study revealed that by 2011 there were four local governments in Indonesia providing interactive online service directly to citizens within their voluntary e-government systems. These systems enable citizens to log in and make some

transactions with the government online. However, the interactive e-government systems in the other two districts had just started in 2011, thus there was no user yet.

Two sampling strategies were applied; stratified random sampling in Sleman District and snowball sampling in Tulungagung District. Stratified random sampling was prioritised to ensure that the demographic characteristics (gender and residential place) were represented. In Sleman district, researchers acquired e-government users' data list from the government. Based on the list, the users were divided into subgroups by the demographic characteristics, and then members of each subgroup were contacted randomly by phone to participate in an interview. Researcher interviewed 7 users in Sleman District. However, researchers could not get a list of e-government users due to technical difficulties in Tulungagung District. Instead, the One-Stop Service Bureau (BPPT) gave one user's identity, and then with the assistance of this user, researcher contacted 4 other users. This snowball sampling strategy is popular among researchers when it is difficult to reach populations (Berg 2004). After being transcribed and translated into English, the interview data was managed using NVivo8. Researchers applied modus operandi approach, which analysed the same factors from multiple instances. And during developing the variables, this research followed both theoretical replication as well as literal replication (Chan and Ngai 2007).

FINDINGS

Demographic characteristics of informants

Table 3 describes the characteristics of informants based on demographic groups. According to the informants who lived in urban areas, access to internet and e-government online system was not a problem, as they were able to easily access internet. However, for those who lived in remote areas, internet connection could be difficult to access. Informant 11, for instance, who lived in mountainous area with no telephone signal, had to travel out of his area or to his office in the city to access internet connection. On the contrary, informant 2, 3 and 6, who lived in the remote area, did not experience any difficulties in accessing internet connection. Table 3 suggested that most of the e-government users interviewed in this research were located in city area.

In terms of age group, most of the informants (N=7) belonged to age group 30-40. Those who belonged to age group 20-30 and 30-40 did not experience difficulties in term of access and capability. However, informants 1, 4 and 12, who belonged to age group 40-50, admitted that they were assisted by their children in utilizing e-government system. One of the interesting findings in this research was the influence of gender on e-government usage. Although researcher had put considerable effort to include female informants, only one informant agreed to participate. Researcher had contacted nine potential female informants; however, eight of them refused to participate. They confessed that even though the e-government documents were registered under their names, their husbands actually completed the online process on their behalf.

Table 3. Characteristics of informants based on demographic groups

Informant	Region	Residential Place	Age Group	Gender
Inf.1		City Area	40 – 50	Male
Inf.2		Remote Area	30 – 40	Female
Inf.3		Remote Area	30 – 40	Male
Inf.4	Sleman District	City Area	40 – 50	Male
Inf.5		City Area	30 – 40	Male
Inf.6		Remote Area	30 – 40	Male
Inf.7		City Area	20 – 30	Male
Inf.8		City Area	30 – 40	Male
Inf.9		City Area	30 – 40	Male
Inf.10	Tulungagung District	City Area	20 – 30	Male
Inf.11		Remote Area	30 – 40	Male
Inf.12		City Area	40 – 50	Male

Relationships among variables of digital divide

The research model (Figure 1) proposes that economic divide influences access divide, which then influences capability divide, which ultimately influences the innovativeness divide. Based on the content analysis, relationships among access divide, capability divide and innovativeness divide were agreed by all of the participants. However, the influence of economic divide on the access divide was only supported by half of the informants (N=6).

For the relationship between economic and access divide in particular, six informants confirmed that economic divide influenced access divide. Although the cost to access ICT got cheaper from time to time, accessing ICT was not a priority for some people who were still struggling to fulfill basic needs. Informant 3 stated, "*The cost for accessing internet is much cheaper now. However I will access internet more, when I have a better economic condition*". Six other informants didn't agree that economic divide influenced access divide. The disagreements were based on the arguments that the cost of accessing internet was already cheap, that it was not a significant issue anymore.

All informants agreed on the relationship of access divide and capability divide. They believed that the more intensely they access ICT, the more they became familiar with ICT, and thus capability in using ICT would increase as well. Participant 4 also argued, "*I believe so. How can we be capable of using ICT if do not have any access to it?*"

All informants (N=12) also agreed that capability divide influence innovativeness divide. Most of them believed that in trying new ICTs, they needed to be capable of operating them. Informant 11 mentioned, "*I need at least basic capability when I try new gadget or software. Otherwise, I will not try them.*" Based on the content analysis, the relationship among the variables of digital divide as proposed in the model was expected.

The impacts of digital divide on e-government use

Most informants (12 of 14) stated that economic condition did not influence e-government usage. They mostly believed that, nowadays, cost for internet connection was not an issue anymore. Informant 9, for example, stated that, "*I don't think that the economic condition influences the usage of e-government online system as nowadays we can easily find internet facilities in the shopping centers, restaurants and other public areas. We can access internet for free...*". Only two informants (Inf.7 and Inf.8) suggested that e-government usage was influenced by economic condition. Informant 8 argued, "*As I have an increased income, I might be able to have all facilities including internet. And by having internet connection, I believe more people will use e-government...*". This finding is interesting because most previous studies, as mentioned in the literature review, confirmed the relationship between economic condition and e-government usage.

With regard to the influence of access divide on e-government usage, all informants (N=12) agreed that access was one of the most important factors. Most of the users did not experience any difficulties in accessing internet and e-government system. According to the informants, access was prerequisite for citizen in utilizing e-government system. Interviewee 9 emphasized, "*Yes I believe that access is important for e-government usage. How can you use the system if you cannot access it?*". The responses confirmed that access divide was one of the key determinants of e-government use.

In terms of dimension of access divide, three dimensions of access divide were examined. All of the respondents agreed with the first (easiness) and third (comfort) dimension, as they actually felt easy and comfortable in accessing any ICT (TV, radio, phones, internet, etc.). Furthermore, six participants agreed that 'place of residence limits the access to online system' (second dimension). Informant 2, who lived in remote area, stated "*...it is more difficult in mountainous areas, like my area*".

The analysis of the semi-structured interviews showed that all of the informants considered capability as the key determinant of e-government use. Participants believed that capability in operating online system was substantially required for e-government usage. Informant 1 strongly suggested, "*Capability is a must. Without it, citizen cannot use e-government*". Thus, the relationship between capability divide and e-government usage was confirmed by the findings in this research. Interestingly, Informant 5 pointed out that capability would influence perceived ease of use (PEoU) and then PEoU would affect e-government use in turn. Informant 5 stated, "*The increase of capability in using a particular system, I believe will increase my understanding of it. And if I think that the system is easy to use, I might then use it*".

Researchers found the informants involved in this research were familiar with information and communication technology (ICT). They felt confident and comfortable in using ICTs, although for some informants, their main motivation to utilize ICTs was simply to fulfill their needs, particularly in relation with business. Informant 11 stated,"*...I use this service by accident. I mean, because I was curious... Because I get use to explore new websites and ICTs, I just feel confident in filling the form and following the online procedures...*"

The analysis revealed that all of the informants (N=12) were curious of new ICTs. They would seek a way to try new ICTs when they heard about it. Furthermore, most of the participants (10 informants) liked to experiment with new ICTs. Most of the informant (7 of 12) did not hesitate to try new ICT, but the rest o (5 informants) felt reluctant, due to the fear from virus, data theft and hackers.

Extension of the Tentative Research Model

The final model is presented in Figure 2, which concludes the findings and extend the tentative research model. Although the final model is reasonably similar to the tentative model, one variable was added, which is the perceived ease of use. Perceived ease of use is the extent to which a person believes that using a technology will be free of effort (Venkatesh 2000). Based on deductive approach, comment from informant 5 was supported by literatures (Agarwal et al. 2000; Carter and Belanger 2005; Chan et al. 2010; Yao and Murphy 2007). Furthermore, Venkatesh (2000) argued that individuals were expected to anchor their perceived ease of use of a new system to their general beliefs regarding computer use, which one of them is computer self-efficacy. In other words, the relationship between self-efficacy and e-government use is mediated by perceived ease of use.
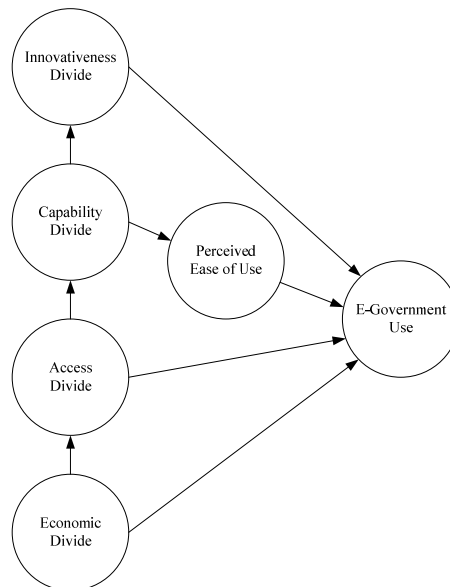

Figure 2. Final model, extension of the tentative model

DISCUSSION AND IMPLICATIONS

Theoretical contribution and implications

This research is a pioneer in advancing the theoretical account of the digital divide. This study goes beyond previous studies on digital divide and comprehensively describes how the economic divide affects access divide, which then influences capability divide, which in turn impacts on the innovativeness divide. This theoretical account contributes to the more advance explanations of digital divide as a socio-economic phenomenon. Overall, this research makes four theoretical contributions. *First*, the previous model of digital divide by Dewan and Riggins (2005) and Wei et al. (2010) is extended into four-order of digital divide framework. This framework can be applied and tested in wide variety of context to establish the boundaries of its applicability.

Second, the results provide explanations on how the factors of digital divide affect one another as proposed in the research model. As a basic requirement, good economic condition is needed to widen the opportunity to access ICT. For poor people, investments in ICT and internet connection obviously are not a priority. This, in turn, will be an obstacle for the citizens to access ICT and will create an issue in digital inclusion. The findings also highlight the relationships between access divide and capability divide as well as relationships between the capability divide and innovativeness divide. Based on these results, a more comprehensive policy to close the digital divide is needed.

Third, this study introduces a new order of digital divide, which is innovativeness divide. The results are in agreement with previous study by Dijk and Hacker (2003), which suggested that motivational problem existed in using new technology. Such mental problems are also experienced in Indonesia and Asia in general, where culturally the people tend to avoid risks. Thus, the barriers to try any technological innovations, particularly internet based technology, should be removed. Hesitancy and anxiety are among those. Improving computer self-efficacy is one of the significant ways to improve motivation or willingness to try technological innovation.

Fourth, self-efficacy or perceived ability to operate ICT is a critical factor in technological change decisions. Self-efficacy on one hand would influence perceived ease of use and in turn would affect e-government use, and on the other hand, would also influence the willingness to try out any new ICT.

Implications for practice

The results of this research have important practical implications particularly in relation to improving the e-government use or e-government readiness. Lack of use and access to e-government systems would in turn cause wider inequalities in the society (Jorgansen and Cable 2002; Warren 2007). As presented in Table 2 earlier, the e-Government Readiness Survey shows that development of e-government systems in Indonesia was not progressing, if not regressing. Indonesia needs strategic and integrative policies to improve their e-government system. This research provides understanding on the issue of digital divide more comprehensively as the basis of integrative policy to close the gap.

The demographic characteristics of e-government users in this study were male, age of 30-40 and lived in city area. Most of the previous researches in digital divide found similar demographic characteristics of internet users. However, in order to expand e-government users, the government should pay attention to other potential groups of people.

The results of this study indicated that due to the low cost of internet connection nowadays, economic condition was not perceived as an important issue in relation with the usage of e-government. However, according to Badan Pusat Statistik (BPS) or Statistics Indonesia (2011), in 2011, there are 11.05 million and 18.97 million poor people in rural and urban area, respectively, counting for 9.23% and 15.72% of people in rural and urban area in Indonesia who live below the poverty line. Those people are still struggling with basic needs and might not consider investment in ICT.

The participants of this study emphasized the importance of access divide; capability divide and innovativeness divide on e-government use. Thus, the government should comprehend that digital divide is not just about the inequality between those who have access and those who do not, and therefore, providing access is not the only policy needed to close the digital divide. In addition to access provision, the government should educate its citizens in utilizing ICT and socialize the existence and benefits of e-government in order to remove citizens' hesitancy.

Limitations and Future Research Directions

Most of the evidence in this study was collected using interviews then interpreted by the researchers. Subjectivity of the researchers may have influenced the data analysis. In addition, this research excluded non-users of e-government in the sample, who might have different views on e-government usage and digital divide.

Future research should be directed on testing the findings by applying quantitative method involving a larger number of users. In the future, it will also be important to include non-users and explore the difference behaviour toward e-government between users and non-users.

CONCLUSION

This study was based on the evidence from 12 e-government users to investigate the phenomenon of digital divide and its impact on e-government use. A qualitative field study was used to explore and extend a tentative research model, and the result confirmed that there were four orders of digital divide which affected the decision to use e-government systems. This research contributes significantly for the theoretical development in the literature of digital divide and e-government and to the information systems field by providing the more comprehensive framework to understand the issue of digital divide. Practically, this research is important for governments by providing evidence of the impacts of digital divide on e-government use .

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