Digital Divide, Deprivation, and Access to e-Government Services

Case Study: Semarang, Central Java, Indonesia

NOVI SULISTYANINGSIH

ENSCHEDE, THE NETHERLAND, FEBRUARY, 2017

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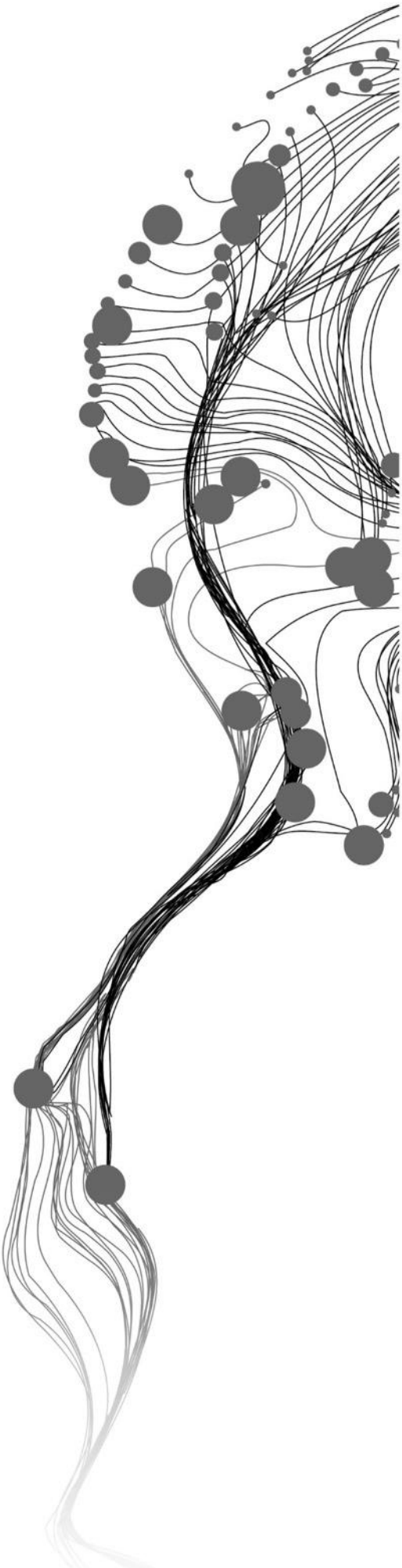

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NOVI SULISTYANINGSIH
Enschede, The Netherlands, February, 2017

Thesis submitted to the Faculty of Geo-Information Science and Earth Observation of the University of Twente in partial fulfilment of the requirements for the degree of Master of Science in Geo-Information Science and Earth Observation.
Specialization: Urban Planning and management

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ABSTRACT

Digital divide studies often focus on identifying the cause of the divide in a different socio-economic group such gender, age, education, jobs, and income or spatial characteristic such rural-urban or remote-main areas but never identifying the divide in different socio-economic agglomeration areas within the city or urban areas. This study tends not only to identify the cause of the digital divide in socio-economic agglomeration areas within the city but also the effect that digital divide has over households' ability to access and make use of ICT technologies and ICT provided information/services. Additionally, nowadays digital technologies are increasingly used by cities in the Global North and South through e-government services in city planning and management tasks. Hence, the digital divide and deprivation are assumed to be linked to the differences in access to e-government services as noticed in deprived and non-deprived neighbourhoods. By understanding the cause of the digital divide, deprivation, and access to e-government service, this study is aimed at analyzing the relationship among these in online complaint platform, particularly for water service.

Using a case study in Semarang, the socio-economic data was used to map the deprivation which will show the deprived and non-deprived neighbourhoods in Semarang. This research is selected the extreme cases by choosing one of the most deprived and non-deprived neighbourhoods because it was expected that the differences in access to and use of the Internet in such neighbourhoods should be clearly visible. As a consequence, the results of this research cannot be generalised for the whole city. The four dimensions of digital divide - motivational, material, skill and usage were used to develop the questionnaire and to guide the data analyses. The questionnaire also aimed at understanding the distribution of the use of e-government services for water service complaints to show the relationship between the use of these services, deprivation, and the digital divide.

The results show that Internet access and use is better in non-deprived than deprived neighbourhood, but it is not influencing people in the non-deprived neighbourhood to use e-government for water service complaint more than deprived neighbourhood. Since the online complaint platform is relatively new in Semarang, people are not aware of it, and they still use the old ways for complaining by calling the customer service of PDAM or going to PDAM directly to report the problem. More than that, the complaints mainly relate to water service quality area which means that people's complaints are related to the problems in their area and not related to the different socio-economic characteristics or their access to the Internet.

Keywords: *digital divide, deprivation, e-government service, complaints*

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Novi Sulistyaningsih

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LIST OF ABBREVIATION AND ACRONYMS

BAPPEDA	*Badan Perencanaan dan Pembangunan Daerah* (Regional Planning and Development Department)
BAPPENAS	*Badan Perencanaan Pembangunan Nasional* (National Planning and Development Agency)
BPS	*Badan Pusat Statistic* (Statistic Bureau)
DISTAKO	*Dinas Tata Kota* (City Planning Department)
GIS	Geographic Information System
ICT	Information and Communication Technology
IMD	Index of Multiple Deprivation
ITU	International Telecommunication Union
LAPOR!	*Laporan Aspirasi dan Pengaduan Masyarakat* (Aspiration and Complaint Report)
OECD	Organization for Economic Cooperation and Development
PATTIRO	*Pusat Telaah dan Informasi Regional* (Regional Studies and Information Center)
PC	Personal Computer
PDAM	*Perusahaan Daerah Air Minum* (Piped Water Service Company)
PODES	*Potensi Desa Data* (Potential Village Data)
PU-PERA	*Kementerian Pekerjaan Umum dan Perumahan Rakyat* (Ministry of Public Works and Public Housing)
SMS	Short Service Message
SPSS	Statistical Package for Social Science
SUSENAS	*Survey Sosial Ekonomi Nasional* (National Social Economic Census Track)
UKP4	*Unit Kerja Presiden bidang Pengawasan dan Pengendalian Pembangunan* (Presidential Working Unit for The Supervision and Management of Development)

1. INTRODUCTION

This part will discuss the background and justification of the research, research problem, conceptual framework, research objective and question, methodological framework, and organization of the thesis. The background and justification explain the importance of studying the relationship of the digital divide and deprivation over the access to e-government service for online complaint platform. The research problem explains the rising problem of digital divide and deprivation over access to e-government service. Conceptual framework shows the basic concept of digital divide, deprivation, and access to e-government service which is needed to be explored to support the study. Research objectives and questions show the general and specific objectives and the research questions. Methodological framework shows the steps in doing the research, and lastly the organization of the thesis explains each part of the thesis from the background to the conclusions and recommendations.

1.1. BACKGROUND AND JUSTIFICATION

Information and Communication Technology (ICT) such as the Internet is an important factor in shaping human life and its environment. The Internet is increasing the social interaction among people, helping people to search for jobs, being a medium for education and other usage. Nowadays, with the popularity of smartphone and access to wireless connection, people can easily handle information which can be accessed anywhere, everywhere, without barriers (Brabazon, 2015). A study from Leung & Lee (2005) shows that there is a positive impact in Internet activities such as using the Internet for sociability, fun-seeking and information-seeking with various dimensions of social support linked directly to quality of life improvements. The Internet also can be used as a tool to support economic life by using it in searching for jobs, supporting businesses and work (Penard et al., 2015). Graham & Marvin (1999) have argued that the relationship between new media and telecommunication technologies and the future of the cities are important. Nowadays, in the "digital era" many cities are developing initiatives to create a smart city to increase the quality of life for the city inhabitants while providing sustainable development (Bakici, Almirall, & Wareham, 2013).

Even though the Internet access is important, there is a gap in it in various ways. The gap in the access to The Internet is known as digital divide, or digital distinctiveness (van Dijk, 2006; Zillien & Hargittai, 2009). The Organization for Economic Co-Operation and Development (OECD) (2001) defines digital divide as the gap between individuals, households, businesses, and geographic areas of different socio-economic levels with regards to both access to ICT and to their use of The Internet for a wide variety of activities. As a new knowledge, the study about digital divide is still growing over time. According to van Dijk (2006), digital divide studies suffer from lack of theory, interdisciplinary research, qualitative research, and tend to be static.

Most researchers argue that the digital divide is closely related to the problem of social inequality, because studies show that the majority of the world's citizens that do not have access to the Internet are also associated with inequalities of income and class, gender, race and age (DiMaggio & Hargittai, 2001; van Dijk, 2006; Helsper, 2008). Hargittai (2008) also added that the latest concept about digital divide recognizes the influence of socio-economic status to the ways in which people access and use the Internet. A theory about digital divide was developed, which shows that personal and positional backgrounds affect internet access and use differentiation which finally also affects the disparities to individual participation in the society (van Dijk, 2005).

Besides social inequality, other researchers also found that geographic location also affects the digital divide (Chen, 2013). A research has shown the differences in access to the Internet and use in the suburban, urban, and rural areas. The rural users have lower access and hence lower use of the Internet than urban or suburban users (Stern,

Adams, & Elsasser, 2009). A similar divide related to geographic location is also shown in a study by Sujarwoto & Tampubolon (2016) that illustrates how geographic location in Indonesia is a factor affecting digital divide. Based on their research, the digital divide problem in Indonesia appears across socio-economic groups and across locations (urban-rural, city-countryside, and remote island-mainland areas).

The concepts of inequality in socio-economic factors or location are discussed separately in the digital divide researches. According to Pacione (2003) there is a relationship between socio-economic status with location factor that caused the social-spatial variation in quality of life. As explained by Pacione, the reason of uneven geographic location has been discussed since many years ago, and one of the reasons is political economy. The political economy perspective argues that the capital flow goes to an area with greatest potential return on investment rather than the area with no such potential return. This phenomenon causes the uneven development which is manifested in socio-spatial variation in quality of life and in the poverty, powerlessness, and polarization of disadvantaged residents. Areas with greatest potential return on investment have better quality of life that make rich people choose to live there or invest further in these areas. Conversely, the areas with the lowest potential return will be areas with high concentration of disadvantaged people, deprived areas, and closely related to problems such as urban poverty and urban decline (Pacione, 2009).

People who live in deprived areas also face problems such as health issues, crime, poor environment, and have less opportunities in life than people who live in non-deprived areas. One of the opportunities is the access and use of the Internet. It assumes that if they are still struggling to satisfy their basic needs, they will not be able to satisfy the luxurious needs such as having a computer or smartphone and access to the Internet and they might also not have basic knowledge in using the Internet or operating the gadget (Martinez, Pfeffer, & van Dijk, 2011). Consequently, they will miss out on the opportunity to participate in the governmental activities since all of the government service is delivered and monitored through the Internet using e-government.

E-government is a new way of public-sector organization across the globe to deliver public services, engage citizens, and improve efficiency by using Internet technology and other ICT platforms (Trimi & Sheng, 2008). Hopefully, e-governmente will offer great potentials and opportunities to improve governance, citizen satisfaction level, and democratization, especially in the developing countries (Ndou, 2004). One of the e-government applications is e-complaint for public service that is useful to get to know about citizen satisfaction levels to public services which can be used as input for public services improvement.

So far, it seems that the relationship of the digital, deprivation, and access to e-government services still requires exploration. Since the past research has only explored the digital divide, deprivation and access to e-government services separately, there will be a new opportunity in this research to know further about their *cause and effect* relationship. Hence, this research will try to explore the relationship between the digital divide and deprivation and their effects on the e-government services access especially for online complaint platform.

1.2. RESEARCH PROBLEM

The concept of digital divide not only shows the differences in individual, household or organizational categories, it also shows the spatial differences. It seems that the digital divide concept has connection with deprivation concept because deprivation explores the individual's or household's limitation in achieving standard quality of life and digital divide is one of the limiting factors. Deprivation shows the spatial pattern of inequality and areas can be differentiated into deprived and non-deprived areas. The non-deprived areas are known for having better social-economic characteristics than deprived areas. The exploration of the effect of spatial factor on the current digital divide studies are still focused on the differences of the Internet access and use in big areas such as urban-rural areas or remote-main island areas that involves the socio-economic characteristics of those areas. However, none of them have tried to explore the differences within city or urban area. Hence, it will be a good opportunity to

explore the digital divide, the concept of spatial pattern of deprivation and the effect of these on e-government access in urban areas.

Along with the rapid growth of the Internet, many governments are beginning to use technology and the Internet to support democratisation and good governance through e-government (Bekkers (2003); Chan et al. (2003)). E-government is defined as the use of ICT, aimed at improving the access to and delivery of public services by citizens, businesses, and societies (Heeks, 2001). The expectation is that e-government will increase the citizen participation, but research seems to indicate that access and use of the Internet and access to e-government initiatives are dominated by people who have better education, are wealthier, and are more urban (Thomas & Streib, 2003). Since the characteristics of people who live in deprived areas are the opposite, the possibility is that deprived people will have less interaction with the Internet and e-government services. However, further research is still needed to get evidence to validate this assumption.

The limitation of the digital divide study is the data availability related to the access and use of the Internet. For the Global North countries, it is possible to get data about access and use of the Internet within urban areas, but the condition is different in Global South countries such as Indonesia. The existing data only covers access and use of the Internet in a larger scale such as city or nation but none of them at a spatial scale within urban areas. International Telecomunication Union (ITU) (2014) gives guidance on how to get data about Internet access and use, but not all countries have implemented it. Therefore, due to data limitation, it is necessary to collect data related to Internet access and use to prove the assumption of the digital divide in different neighbourhoods within city and its effect on participation to the governance society in the deprived area.

1.3. CONCEPTUAL FRAMEWORK

Deprivation, digital divide, and the difference in accessing e-government services are consequences of inequality. The differences in socio-economic characteristics at individual, household, or organization level are a form of inequality as shown in deprivation which influences access to and use the internet and e-government services' access. Since the deprivation can be seen in the spatial patterns, represented by the socio-economic agglomerations in urban areas, the Internet access to and use will also follow these spatial patterns of deprivation. As a consequence, the deprived area will have lower access to the Internet than non-deprived areas which will affect access to e-government services. The conceptual framework for this research can be seen in figure 1.

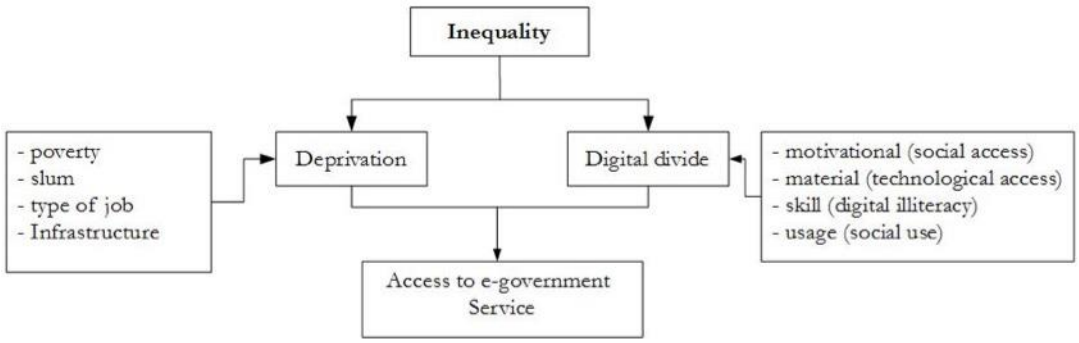


Figure 1 Conceptual framework

1.4. RESEARCH OBJECTIVE AND QUESTION

1.4.1. GENERAL OBJECTIVE

To analyse the relationship between digital divide, deprivation and access to e-government service in urban areas.

1.4.2. SPECIFIC OBJECTIVE AND RESEARCH QUESTION

To achieve the general objective, the specific objective of this study are as follows:

1. To show the spatial distribution of deprivation in urban areas
   a. What are the socio-economic dimensions to measure deprivation?
   b. What are the indicators of deprivation that are appropriate to the local context?
   c. How to differentiate the deprived and non-deprived neighbourhoods in the urban area based on deprivation factor scores?

2. To analyse the relationship of the deprivation with the digital divide
   a. What are the dimensions of the digital divide?
   b. How is the actual condition of the digital divide in the urban area?
   c. How is digital divide correlated with the deprivation?

3. To analyse how to do the deprivation and digital divide influence the access to the e-government for the water service complaint
   a. How are the household's interaction with the e-government for water service complaints?
   b. How do the deprivation and the digital divide influence access to e-government for water service complaint?

1.5. METHODOLOGICAL FRAMEWORK

The research framework as can be seen in figure 2 is divided into 4 parts that show the stages of this research. In the first part, it starts with formulation of research problem and objectives based on identification of lack of the digital divide research and its influences on access to e-government services. In the second part, the literature review guides us to get better understanding of the related concepts (the digital divide, deprivation, and access to e-government services) which results in selected indicators and built concept which are useful for data collection, analysis, and discussion. Third part discusses the data requirement and collection. Since the secondary data is not enough for achieving the research objective, it is needed to collect primary data from the field by using a questionnaire. This questionnaire is designed based on the concept/indicators from literature review. Before any primary surveys can be conducted, the study areas must be selected. In the last part, the analysis for achieving the specific objectives 2 and 3, is shown after data collection. Most of the data has been analysed using 'crosstab' analysis in SPSS, especially for showing the relationships among the digital divide, deprivation, and access to e-government. The ArcGIS was also used to help in mapping spatial pattern of deprivation.

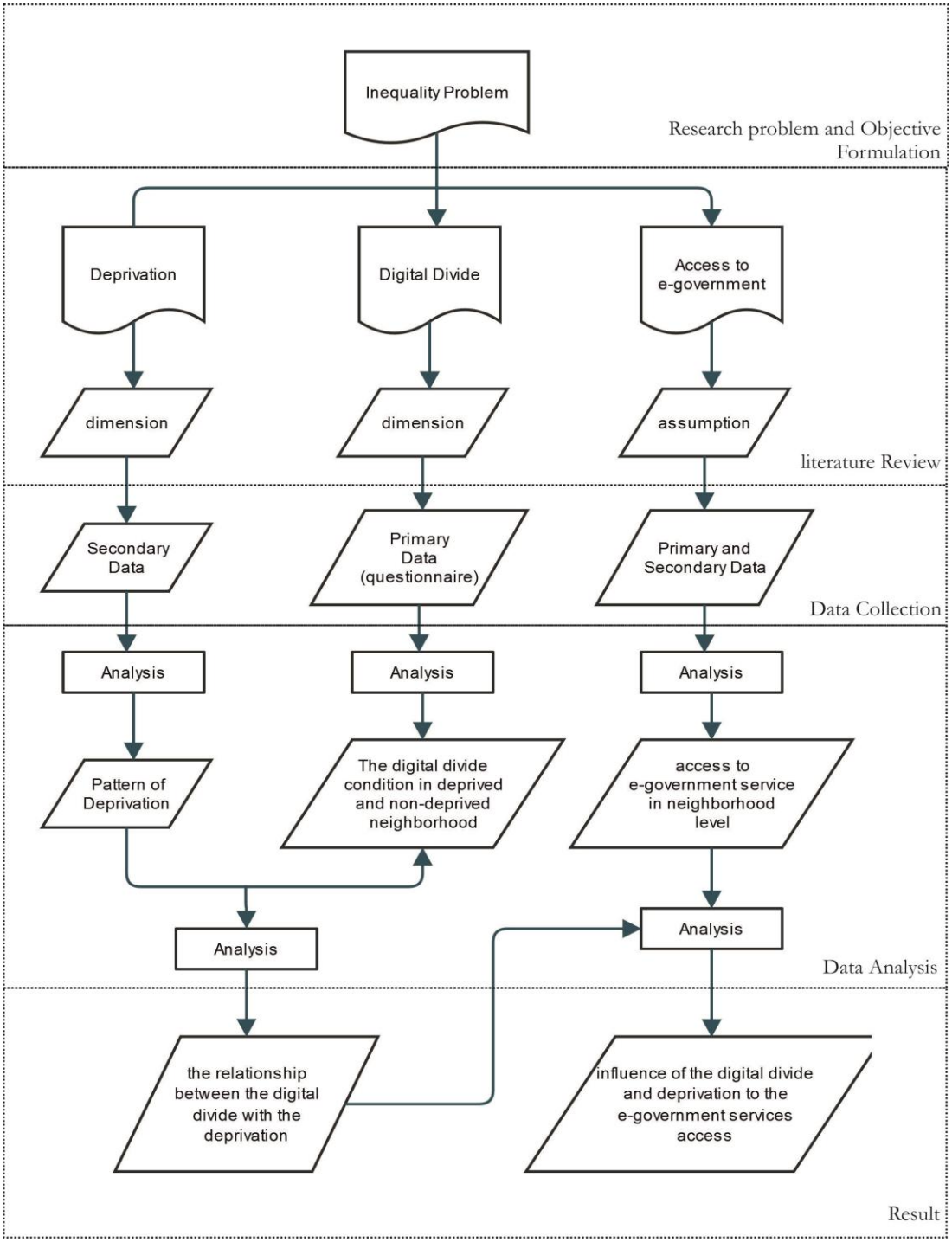


Figure 2 The methodological framework

1.6. RESEARCH DESIGN MATRIX

The research design matrix integrates the research from the beginning to the end as can be seen in Table 1

Table 1 Research design matrix

Specific Objective	Research Question	Technique of Analysis	Required data	Output
General Objective: To understand the relationship between the digital divide with the deprivation and access to the government digital information and services				
To map the pattern of deprivation	a. What are the socio-economic dimensions to measure deprivation? b. What are the indicators of deprivation that are appropriate to the local context? c. How to differentiate the deprived and non-deprived neighbourhoods in the urban area based on deprivation factor scores?	- Literature review - IMD - boxplot	- Socio-economic data - A map with neighbourhood unit	Patterns of inequality in urban areas which show the deprived and non-deprived neighbourhoods
To explore the association of the deprivation with the digital divide	a. What are the dimensions of the digital divide? b. How is the actual condition of the digital divide in the urban area? c. How is digital divide correlated with the deprivation?	- Crosstab - Descriptive	- Dimension of the digital divide from literature review - Questionnaire - The complaint data of water service	Relationship between digital divide and access to government digital information and services
To explore how the deprivation and digital divide influence the access to the e-government for water service complaint	a. How are the household's interaction with the e-government for water service complaints? b. How do the deprivation and the digital divide influence access to e-government for water service complaint?	- Crosstab - Descriptive	- Questionnaire	Influence of the digital divide and deprivation to the e-government service access

1.7. ORGANIZATION OF THE THESIS

The thesis structure will be organised as follows:

Chapter 1 Introduction

This chapter presents the background and justification for the study that leads to the research problem, research objective, specific objectives, research questions and the organization of the thesis structure.

Chapter 2 Literature Review

This chapter explains key points and important information for the research. It explains and defines digital divide including the dimensions and important indicators for digital divide and theories about spatial inequality and social inequality.

Chapter 3 Methodology

This chapter will describe the methodology of the research, including the survey design, execution of the survey and also data processing that was conducted in advance.

Chapter 4 Study Area

This chapter introduces Semarang city based on geographic, demographic, socio-economic characteristic. Also, this chapter also gives a general overview of Internet access and use in Semarang city and the smart city concept that will lead to digitalize government information and services.

Chapter 5 Result and Discussion

This chapter is showing the result from analysis and discussing the analysis result include: (1) the patern of deprivation; (2) the relationship of the digital divide and deprivation which is explaining the dimension about the digital divide, the internet access and use characteristic in both neighbourhood, and the relationship of the digital divide and deprivation; (3) The influence of the digital divide and deprivation to the access to e-government service for water service complaint which are explaining about the household's and neighbourhood interaction with e-government for water service complaint and the influence of deprivation and digital divide to the e-government access for water service complaint.

Chapter 6 Conclusions and Recommendation

This chapter summarizes the main conclusions from the thesis, and provides some recommendations for further studies based on this research's contributions and limitations.

2. LITERATURE REVIEW

This part will discuss key concepts for this research. The main concept here is a digital divide, which will be related to that of deprivation and the importance of access to e-government services. To understand about the digital divide, it needs to explain the definition of the digital divide concept from many perspectives, the concept inequality in the digital divide and the dimensions in measuring the digital divide. On the other hand, the deprivation concept will explore the theory of deprivation and the explanation about deprivation in the local context. Lastly, access to e-government service will explore about the explanation about e-government, the implementation of e-government service and lastly is about the inequality access of e-government service.

2.1. DIGITAL DIVIDE

2.1.1. DEFINITION

The term of digital divide first appeared in the second half of the 1990s among researchers concerned with unequal access and use of the Internet (van Dijk, 2006). Before that, more general concepts were used such as information inequality, information gap or knowledge gap and computer or media literacy. The origin of the term digital divide came from the third series of reports published by the US Department of Commerce's National Telecommunication and Information Administration (NTIA) (Gunkel, 2003). After that, there are many of studies related to the digital divide.

OECD (2001) has defined the term of the digital divide as the "gap between individuals, households, business, and geographic areas at different socio-economic levels with regards both to their opportunities to access ICTs and their use of the Internet for wide variety of activities". The digital divide studies have been done in the various level – from the level individual, household, up to multi-national or global, and in varies spatial level (Pick & Sarkar, 2016).

2.1.2. THE CONCEPT OF INEQUALITY IN DIGITAL DIVIDE

Digital divide is closely related with inequality because the differences of access and use of the Internet can be influenced by the personal and positional categories which related to the social characteristic. According to van Dijk (2005) the personal categories is related to the differences of individual social characteristic which are reflected in gender, age, race, religion, etc. while the positional categories are reflected the type of job, education, income level, etc. which is shown the individual and household level in community . The limitation to the ICT access make the people denied information, for example about jobs, healthcare or welfare, and miss out the political engagement, social networking, and consumption (Halford & Savage, 2010).

2.1.3. DIMENSION OF DIGITAL DIVIDE

Some researchers of digital divide such as van Dijk (2006), Gunkel (2003), Halford & Savage (2010) also criticize the existing digital divide studies. According to van Dijk (2006), the digital divide studies lack theories and interdisciplinary research. Even though there is a weakness in digital divide studies, some researchers built frameworks to provide a clear explanation about its dimensions and the influencing factors (DiMaggio & Hargittai, 2001; van Dijk, 2006; Chen & Wellman, 2007). Although the frameworks are different, they share more similarities than differences. The similarity is because all the frameworks incorporate the motivational, material, skill and the usage as digital divide dimensions. The gap/division happens because of the differentiation of demographic, socio-economic, and location factors.

The motivational dimension was introduced by van Dijk (2006), but it has similarities with the social access dimension by Chen & Wellman (2007). In the motivational dimension, van Dijk (2006) explains several factors that influence people's interest in using the Internet. According to him, people are not interested to use The Internet because they do not see a need or significant usage opportunities in it, have no time or liking, reject the medium (they assume that The Internet and computer games are "dangerous" media), due to lack of money, and due to lack of skill. A similar perspective is also adopted by Chen & Wellman (2007) in their term of "social access". People avoid using The Internet because of lack of awareness, skill, and money. Moreover, they mention the language barrier as also being a factor influencing people's motivation to use The Internet. Cooper (2006) discusses about the differentiation of motivation among gender in using The Internet.

A material dimension is the second dimension from digital divide, and is related to the physical availability of the connection, type of connection, hardware, and software. According to van Dijk (2006), income was the most important factor for physical access, followed by age, and then education. Akhter (2003) relates the user's social background with The Internet price choice and Stern et al. (2009) relates the type of connection to the geographic location.

Skill is a third dimension in digital divide as mentioned by van Dijk (2006), Chen & Wellman (2007), and DiMaggio & Hargittai (2001). Van Dijk (2006) distinguishes the "skill" between "information skills" and "strategic skills". According to him, information skills are the skills to search, select, and process information in computer and network sources which are distinguished into two types: formal information skills (ability to work with the formal characteristics of the computer and The Internet, e.g. file and hyperlink structures) and substantial information skills (ability to find, select, process, and evaluate information in specific sources following specific questions). Strategic skills can be identified as ability to use computer and network sources for a specific reason so that it can improve one's position in society. Chen & Wellman (2007) distinguish the skills according to technological skills and social cognitive skills. A study from van Deursen & van Dijk (2010) found that education and age are contributors in the skill division.

The last dimension that contributes to digital divide is usage, social use or variation in use as mentioned by van Dijk (2006), Chen & Wellman (2007), and DiMaggio & Hargittai (2001). Van Dijk (2006) explains that different uses of The Internet are influenced by social and cultural differences in society. People with higher education, income, and social position in the society will use The Internet for information, communication, work, business, or education. Conversely, people with a low social position, income, and education will use the Internet for simple usage such as for finding information, communication, shopping, and entertainment. Furthermore, according to him, active and creative uses of the Internet will contribute in using The Internet actively by publishing a personal website, creating a blog, posting a contribution on an online bulletin board, etc. Similar explanation about Internet usage also explains by Chen & Wellman (2007), and DiMaggio & Hargittai (2001). DiMaggio & Hargittai (2001) added that people tend to use the Internet more if it offers the positive life outcomes than using it only for consumption purposes. A study from Zillien & Hargittai (2009) shows the usage differentiation among social groups in utilizing The Internet. Similarly, Stern et al. (2009) also found the usage differentiation among social groups and geographical locations. The dimensions and indicators shaping the digital divide can be shown in Table 2.

Table 2 Dimension of digital divide

Dimension	Indicator
Motivational	- Significant usage opportunities - Awareness - Lack of money - No time - Rejection on medium - Language - Lack of skill - Culture
Material	- Connection availability - Hardware ownership - Software use - Type of connection
Skill	- Ability to work with the formal characteristics of the computer and The Internet - Ability to find, select, process, and evaluate information in specific sources following specific questions - Ability to use computer and network sources for a specific reason
Usage	- Information seeking - Resource mobilization - Social movement - Civic engagement - Social inclusion - Active usage - Passive usage

Source: adopted from van Dijk (2006) with modification

2.2. DEPRIVATION

The explanation about the deprivation will start from the explanation about the general concept of deprivation followed by the concept of the deprivation according to the local context.

2.2.1. THE CONCEPT OF DEPRIVATION

Poverty, inequality, and deprivation seem similar in meaning, but actually there are differences between them. Poverty usually is measured by comparing the individual income with the minimum wage. If people have an individual income below minimum wage in a region, it can be judged that those people are living in a poor condition (Dreze et al., 2000). Poverty always follows with the condition of deprivation with lack of resources and poor quality of life (Pacione, 2009).

According to Pacione, the root cause of deprivation is economic and caused by 3 factors: low wages, unemployment, and reductions in welfare expenditure in western countries. Significantly, the poverty-related problems such as poor housing, crimes, unemployment, increasing of mortality and morbidity shows spatial concentration in cities. He added that the physical environment of deprived areas is typically bleak, with poor landscaping, socially and physically isolated and people living in there having limited control over their quality of life. Pacione (2009) called the complex poverty problem as multiple deprivation and behind many others problems as it can be seen in figure 3.

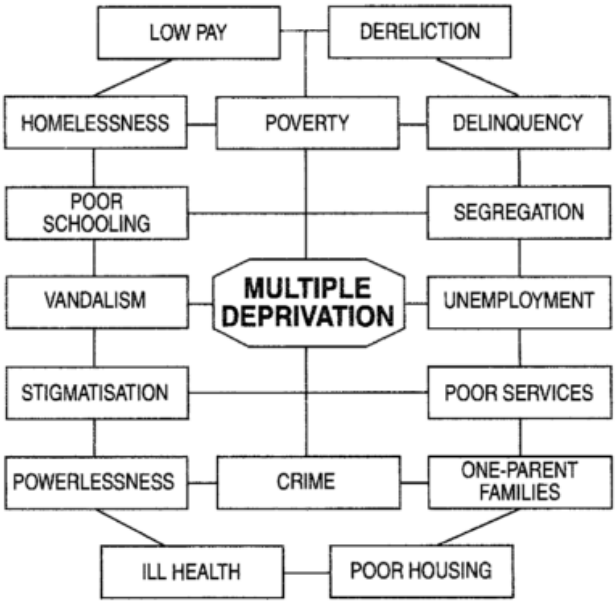


Figure 3 Anatomy of multiple deprivation (source: Pacione (2009))

Measuring poverty and deprivation can be done in several ways. The most common way is by making an index of deprivation. Cabrera-Barona et al. (2016) make a deprivation index for health accessibility using two groups of indicators. The first group represents population characteristics of the study area such as the percentage of people with disability, the percentage of people who don't have formal education, the percentage of unemployed. The second group represents household conditions such as a percentage of household with overcrowding problems, percentage of households without access to water, the percentage of households without access to a sewerage system, percentage households without access to public electricity, percentage of households without garbage collection services, and lastly the distance to the nearest primary health care. Because of the deprivation measurement for health accessibility purpose, the authors incorporated health indicators in the measurement.

Another example of deprivation and poverty measurement came from Dreze et al. (2000) who build a composite measure for deprivation by using an index also. They use several criteria which represent the poverty and deprivation problem such as education level, income, wealth, access to water, sanitation, and energy, employment, transport financial, services, nutrition, health care, safety, and perceived well-being. Besides built an index development, the deprivation measurement can also be built by using factor analysis as research from Whelan et al. (2004).

2.2.2. THE CONCEPT OF DEPRIVATION ACCORDING TO LOCAL CONTEXT

The basic of deprivation theory which explained by Pacione (2009) was related to the poverty problem in the western countries which somewhat doesn't relevant with the developing countries condition. Indonesia as one of developing country has their dimension and criteria to measure the poverty or deprivation. There are many institution in Indonesia which publish to measure the poverty problem (BAPPENAS, 2010a). One of the them is from Indonesia Central Bureau of Statistics (BPS) which is commonly used to measure poverty in national, regional, municipalities, and cities level.

According BPS, the poverty measurement in Indonesia is distinguished into two ways. First is to use concept of the basic need approach and second use the micro poverty which use several type indicators for poverty measurement. In basic need approach, the poverty defines as inability of people to satisfy their basic need in food

or non-food which measure from spending side. Data used for this measurement is from Indonesia National Socio-Economic Survey data (SUSENAS) which contain the comprehensive information about consumption expenditure on more than 300 food and non-food items in 2013 and education/literacy in household and individual level (Hanandita & Tampubolon, 2015). The poverty measurement using the basic need approach be used as poverty measurement in macro level that only published in provincial or municipality level. The micro data about poverty use the household characteristic approach using 14 criteria. The data also provide by BPS and it is useful to get data the poor people who eligible receive the direct cash assistance or Bantuan Langsung Tunai (BLT) in Indonesia from the government.

The criteria to measure the poverty in micro level comprise from several dimensions related to housing facilities, the daily consumption, education level, health access, income, and asset and saving. Each of dimension has several indicators in household level. The result of the measurement using these indicators is the number of poor people in city or municipality which specify into the name of the head household and their address. The scheme of poverty problem in Indonesia can be seen in Figure 4.

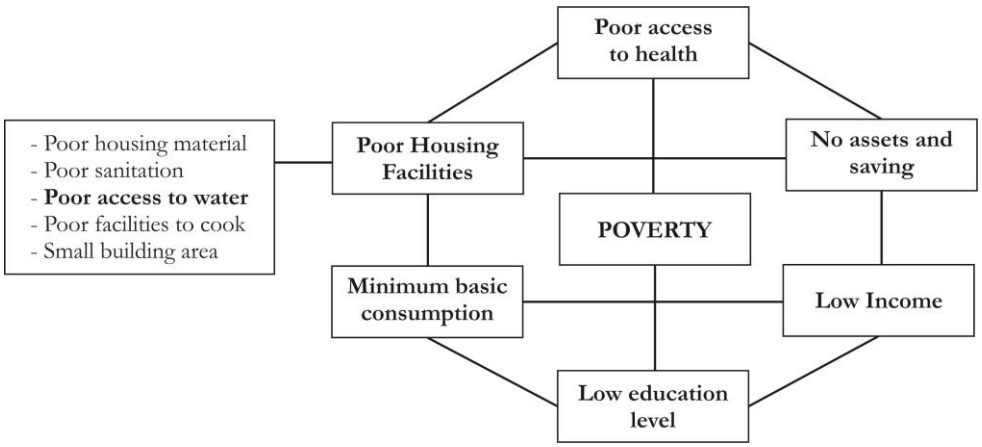


Figure 4 Scheme of poverty problem in Indonesia

Even though poverty dimension and criteria which generated from BPS is applicable in the city or municipality level, but in fact some city or municipality government feel that those criteria is not appropriate with their condition. They built their own criteria but still use the BPS poverty criteria as their basic. Semarang city government is one who have their own criteria to measure poverty in their locality. According the poverty report in Semarang (2015), it is identified seven dimensions of poverty measurement which related to the food, housing, clothes, education, health access, income and asset ownership. The dimension of the poverty measurement in city level is not too different with the measurement from BPS. The differences are in the indicators where the local government add or remove several indicators to the dimension. The comparison of poverty indicator in Indonesia and Semarang can be seen in Table 3.

Table 3 The Comparison of poverty indicator in Indonesia and Semarang

Dimension	Indicators[1]	Indicators[2]
Poor access to the health	• The household is not able to pay the health service	• The household is not able to pay the health service • One of the family members is having disability
Poor housing facilities	• The building area is less than 8 m2 • The floor is from bamboo/cheap wood/soil • The wall material is from bamboo/poor wood/leave/unfinished wall • The house is without the sanitation facilities/using communal sanitation • The house is without electricity • Poor access to water • The cooking fuel use wood/kerosene/charcoal	• The building area is less than 8 m2 • The floor is from bamboo/cheap wood/soil • The wall material is from bamboo/poor wood/leave/unfinished wall • The house is without the sanitation facilities/using communal sanitation • The house only has minimal electrical power (450 watts) • Poor access to water
Minimum basic consumption	• The household is only able to eat meat/milk/chicken once a week • The household is only able to buy the new dothes once a year • The household is only able to eat once or twice a day	• The household is not able to eat the complete meal (carbohydrate, vegetables, and protein) 2 times a day • The household is not able to eat meat/egg/fish/chicken once a week • The household is only able to buy the new dothes once a year • The household is not having dothes for different occasion
No assets and saving	• The household is not able to have saved in the bank, and they don't have an asset to sale again with a minimal value equal to Rp. 500.000 (33 euro)	• The household is not having the productive asset to sale again
Low Income	• The source of family income is from the farmer/fisherman/low paid construction worker/another job with a salary below Rp. 600.000 a month (equal to 40 euro)	• Their income is not able to meet the basic needs
Low Education Level	• The education level of head household is without formal education/not graduated from primary school/only graduated from primary school	• The household is not able to pay the education fees for their family member up to senior high school

Note :
[1] According to the BPS
[2] According to the Semarang City Government

At city level, the measurement of the poverty using the criteria is generated the number of poor people in each neighbourhood. The most interesting here is the minimum income of the household is related to their job type based on the BPS criteria. It means that specific type of job can be great potential factor to the poverty problem. Since the discussion of poverty is related to the slum because it is a forms of the most deprived and excluded form of informal settlement characterized by poverty and large agglomeration of poor housing (UN-Habitat, 2015), so the availability of slum become one factor in deprivation.

There are so many different name of slum such as Favela (Brazil), Barrio or Tugurio (Latin America), Basti (Bangladesh), Bidonville (France/Africa), Kampung (indonesia), Katchi Abadi (Pakistan), etc (The Cities Alliance, 2005). The slum is an area which has the following physical characteristic such as high spatial heterogeneity, complex shape, substandard housing, high building density, small building size, irregular pattern of road network,

poor infrastructure, no or little vegetation (open space), and located in hazardous location (Niebergall et al., 2008). However, the characteristic of slum is different depend on the local context.

In Indonesia, the Ministry of Public Works and The Public Housing has published the regulation related to slum improvement which is also include the criteria and typology of slum in Indonesia. These criteria include several aspect such as the quality of house building, road, drainage, wastewater management, and waste management (PU-PERA, 2016). This regulation generates the distribution of slum in whole Indonesia in neighbourhood level which is useful to deliver slum improvement program.

2.3. CITIZEN'S PARTICIPATION IN E-GOVERNMENT

The citizen's participation in e-government include the explanation about the use of e-government as tool for citizen participation, the opportunities and challenge of e-government initiatives in global south countries, and the inequality in citizen participation using e-government.

2.3.1. E-GOVERNMENT AS TOOL FOR CITIZEN PARTICIPATION

Nowadays, the increasing use of ICT such as the Internet and mobile technologies has revolutionized the way business operated and transformed the delivery mechanism of public services offered by government (Trimi & Sheng, 2008). E-government is a widely accepted term to translate the use of ICT in the public sector. The World Bank (2015) stresses that the use of e-government is useful to transform the government's relationship with citizens, businesses, and/or other government institutions to promote citizen empowerment; enhance service deliver; and increase transparency, accountability, and government efficiency. E-government can be classified based on its segment-served into government-to-government (G2G), government-to-business (G2B), government to citizens (G2C), and government-to-non-profit (G2N) (Kim et al. (2004); Sadat (2014); Amailef & Lu (2008)).

The concept of citizen participation is defined as the capabilities of citizens to help themselves, identifying their need and discovering solutions, and act as the actors instead of the objects of development (United Nations, 2007). Citizen participation allows the citizen to have interaction and negotiation with the government as the public service provider (Pestoff, 2009). The citizen participation is a fundamental cornerstone in good governance (Schneider, 1999). The level of the good governance will be increased along with the high number of citizen participation in development program or in decision making process.

The e-government is turned to be m-government nowadays with the increase of mobile technologies, particularly mobile phones. Mobile phones provide new ways to reach a good governance goal because of its mobile characteristics (United Nations, 2007) which is: they are easy to handle and carry everywhere so that people can access the information everywhere and anywhere. Hopefully, the use of mobile phone for citizen participation can reach the marginalised population so they can easily interact with the government, give feedback and aspirations, and actively to participate in decision making process or other government activities in cost effective manner.

2.3.2. OPPORTUNITIES AND CHALLENGE OF E-GOVERNMENT INITIATIVES IN GLOBAL SOUTH COUNTRIES

The e-government initiatives are popular around the world, not only in Global North countries, but also Global South countries. In Global South countries, e-government has opportunities in promoting efficiency, improving service quality, reducing response times, helping citizen to strengthen their legitimacy, and offering reforms in bureaucracy such as increased transparency, accountability, citizen participation, and trust building with the government; improving the better processes of democratic governance; and affirming to the good governance objectives (OECD (2003); Kumar & Best (2006)). There are several opportunities and challenge in implementing of e-government service, particularly in developing countries.

According to Ndou (2004), several factors related to the e-government opportunities are (1) the cost reduction and efficiency gains; (2) quality of service delivery to businesses and customers; (3) transparency, anticorruption, and accountability; (4) Increase the capacity of government; (5) Network and community creation; (6) Improve the quality of decision making; and (7) Promote use of ICT in other sectors of the society. On other hand, the several challenges face with the e-government implementation are (1) ICT infrastructure (e-readiness, computer literacy, telecommunication equipment); (2) Policy issues (legislation); (3) Human capital development and lifelong learning (skills, capabilities, education, learning); (4) Change management (culture, resistant to change); (5) Partnership and collaboration (public/private partnership, community and network creation); (6) Strategy (vision and mission); and (7) Leadership role (motivate, involve, influence, support).

2.3.3. THE INEQUALITY IN CITIZEN PARTICIPATION USING E-GOVERNMENT

Even though there are lot of opportunities in e-government implementation, but in fact, there is still inequality in citizen participation. The World Bank (2001) report that groups that are politically connected or better educated having naturally advantage to involve in public policy making compare to the disadvantage group. This is also accordance with the research from Cendikia et. al. (2007) about the complaint mechanism in Indonesia which is explained the disability of poor people to complaint about public service quality, behaviour of public service customer in Indonesia, and behaviour of public service provider to the quality and scope of the services. The poor people are often voiceless and sometimes the public policy only capture a little portion from their interest. However, the gap appearing in citizen participation is not only related to the poverty problem, the people social identity such as political view, gender, age, ethnic or religious are having similar role to limit the citizen participation (Gaventa, 2000). These conditions naturally impact their participation to the e-government service.

In the Thomas & Streib (2003) research about the relation between digital divide and governmental website visitor report that there is connection between the digital divide with the government website visitor in context of the inequality. His research found that the government website visitor be in accordance with the digital divide issues which are the government website visitor tend to be younger, be wealthier, have better education, be more urban, and be whiter.

Similar result with different approach shown in research by Martinez et al. (2011). With focus on e-grievance system in India, it is obtained the result that shown the mismatch between deprived areas and self-expressed need areas. The poor group which represented in deprived areas should face the consequence of inequality with limit participation in e-grievance system.

2.4. CONCLUSION

In the end, it can be concluded that there are three major concepts in this research. Firstly, is related to the digital divide, especially focusing on the dimensions of the digital divide that one has to be attentive of when conducting research on this problem. There are four dimension of digital divide relevant to this study which are the motivational, material, skill, and usage dimension. These dimensions will be guiding my data collection (See chapter 3).

Secondly is related to the deprivation, a problem that has ramifications into related issues such as inequality and poverty. In the context of this research my claim is that deprivation will be further enhanced by digital divide. In the deprivation side, the dimensions that can be used to measure deprivation are the poverty, slum, job type, and the infrastructure quality and availability.

Lastly, I discussed about the citizen participation in the e-government, and explained about the citizen participation and e-government concept, the challenges and opportunity in e-government implementation, and the inequality in citizen participation. It is against this background that the case study will be analysed. It is useful to understand citizen participation in e-government to get the initial assumption about the relationship of access to the e-government with the digital divide and deprivation. According to the explanation about the citizen participation and e-government, it can be assumed that people who live in deprived or poor area will have less interaction with e-government.

3. METHODOLOGY

This chapter will explain about the method to do the study case research which is starting from the explanation about survey design which includes the questionnaire design, the selection of neighbourhood for the study area, and the sampling design. Second, The survey implementation which includes the household survey and secondary data collection. Third, it is related to the data analysis and data processing which include the spatial pattern of deprivation analysis, the analysis of digital divide with deprivation analysis, and the influence of the digital divide and deprivation to the e-government access analysis. The last part is related to data generalisation which related to on how to read and generalise the questionnaire data.

3.1. SURVEY DESIGN

3.1.1. QUESTIONNAIRE DESIGN

The questionnaire was necessary to gather information about the Internet access and use in the different neighbourhoods and access to e-government for water service complaint. The questionnaire used structured questions with close questions. This type of questionnaire was useful because the answers from the respondents could be aggregated and quantified (Bryman, 2013). Questions are usually very specific and very often offer the respondent a fixed range of answers. The dimensions of digital divide were needed as guidance for developing a questionnaire to find information about Internet access and use while the question for the access to the e-government obtained based on observation from the common complaints sent to the twitter/website.

As discussed in the literature review about the digital divide dimension, the motivational dimension was related to the importance of the Internet access and use in human life. The material dimension was related to the ownership of the hardware and software for internet connection and amount of money spending on the internet access every month. The skill dimension was related to ability people to operate and use hardware which usually use to access the Internet. Lastly, the usage dimension was useful to know the most popular application and people activities when using the Internet.

The questionnaire comprises three parts with twenty-nine questions (see Annex 1). Part one contained the respondent information with four questions related to the personal information of the respondent, part two contained the Internet access and use with fifteen question which important for measuring the digital divide, and part three contain 8 questions related to access to e-government for water service complaint. The respondent needed to tick the available box to answer the question in questionnaire. Some question contained yes and no questions to facilitate the interpretation and calculation. Most of the categories about respondent information were similar to the Indonesia statistical categories while the questions and categories about the Internet and use were similar with the questions and categories from International Telecommunication Union (ITU) and also from Indonesia statistical office.

3.1.2. SELECTION OF NEIGHBORHOOD BASED ON INDEX OF MULTIPLE DEPRIVATION

To select the neighbourhood for the study area, I was needed to do the initial analysis to identify deprivation patterns and the spatial distribution of water service area by the water company (PDAM). The water service area was only limited for PDAM because the water service complaint use e-government (digital media) is only available for the water company service not for another service/source.

After getting index of multiple deprivation, the index was used in ArcGIS to map the pattern of deprivation by using boxplot for showing the distribution of data in lower outlier, 1st quartile, 2nd quartile (median), 3rd quartile, and upper outlier class.

The neighbourhood selection for study area was based on the location and deprivation index with regards to water service area from the water company. The deprived and non-deprived neighbourhoods have been selected by using

deprivation indexes class which are the 1st quartile class will be the non-deprived neighbourhood and the upper quartile class will be the deprived neighbourhood. In the selection, Bandarharjo was selected as deprived neighbourhood while Panggung Lor was selected as non-deprived neighbourhood because both neighbourhood has extreme case on deprivation. The reason why choosing the extreme case on deprivation because the extreme case would be expected showing the Internet access and use differences and different access to e-government service for water service complaints clearly than selecting the neighbourhood outside extreme case. This research result might couldn't be used to make generalization for whole city but it can give the better understanding about different characteristic on the Internet access and use and access to e-government service in the different neighbourhood characteristic. More than that, the selected study areas are in similar location (coastal zone area) which are also expected to share similar characteristic on water service quality, geographical, and similar problem on tidal inundation. The information of selected neighbourhoods could be seen in table 4 and the location could be seen in figure 5.

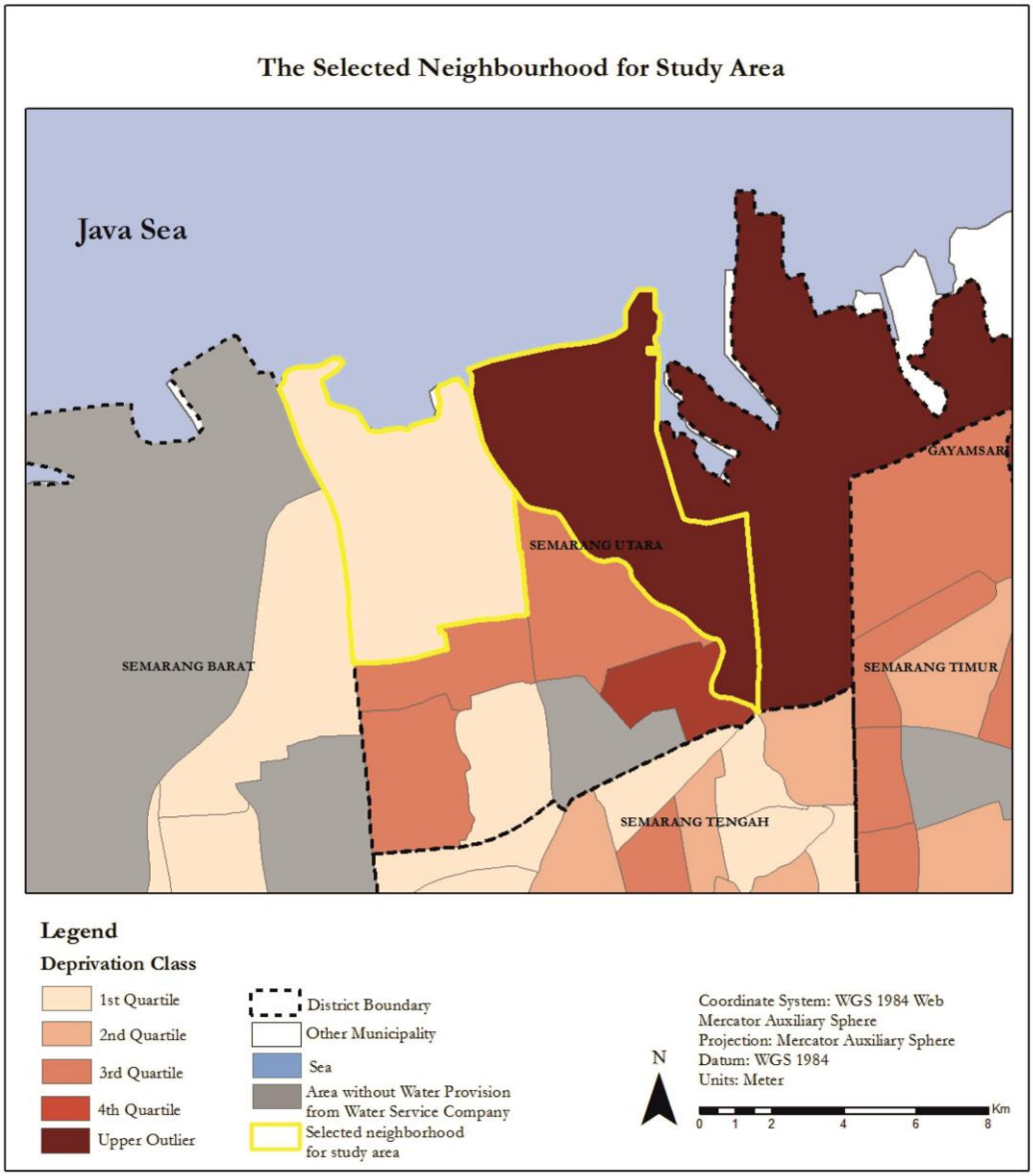


Figure 5 The selected neighborhood for study area

Table 4 The selected neighborhood characteristic

Class	Neighborhood Name	Location	IMD score	Number of households	Number of Population
1st Quartile	Panggung Lor	Coastal zone area	0	2284	14093
Upper Outlier	Bandarharjo	Coastal zone area	0.39	4054	15191

3.1.3. SAMPLING DESIGN

The sampling design that was used here was random sampling design. After getting the selected neighbourhood for the study area, the next step was to calculate the number of sample in each neighbourhood based on household proportion. Since both neighbourhood had huge number of household, so the proportion of 5 % from total household was given with regard with time limitation and available resources. It meant that Panggung Lor and Bandarharjo would have 114 and 203 household samples.

The distribution of samples used the transect walk method where the surveyor walked in every part of neighbourhood and in every road, and pick up one house as household sample until all samples were distributed evenly in the whole neighbourhood. To make it easier in sample distribution, each neighbourhood was divided in several parts as can be seen in figure 6. The surveyor tasks were to walk in every part of neighbourhood and took sample as in the distribution sample map.

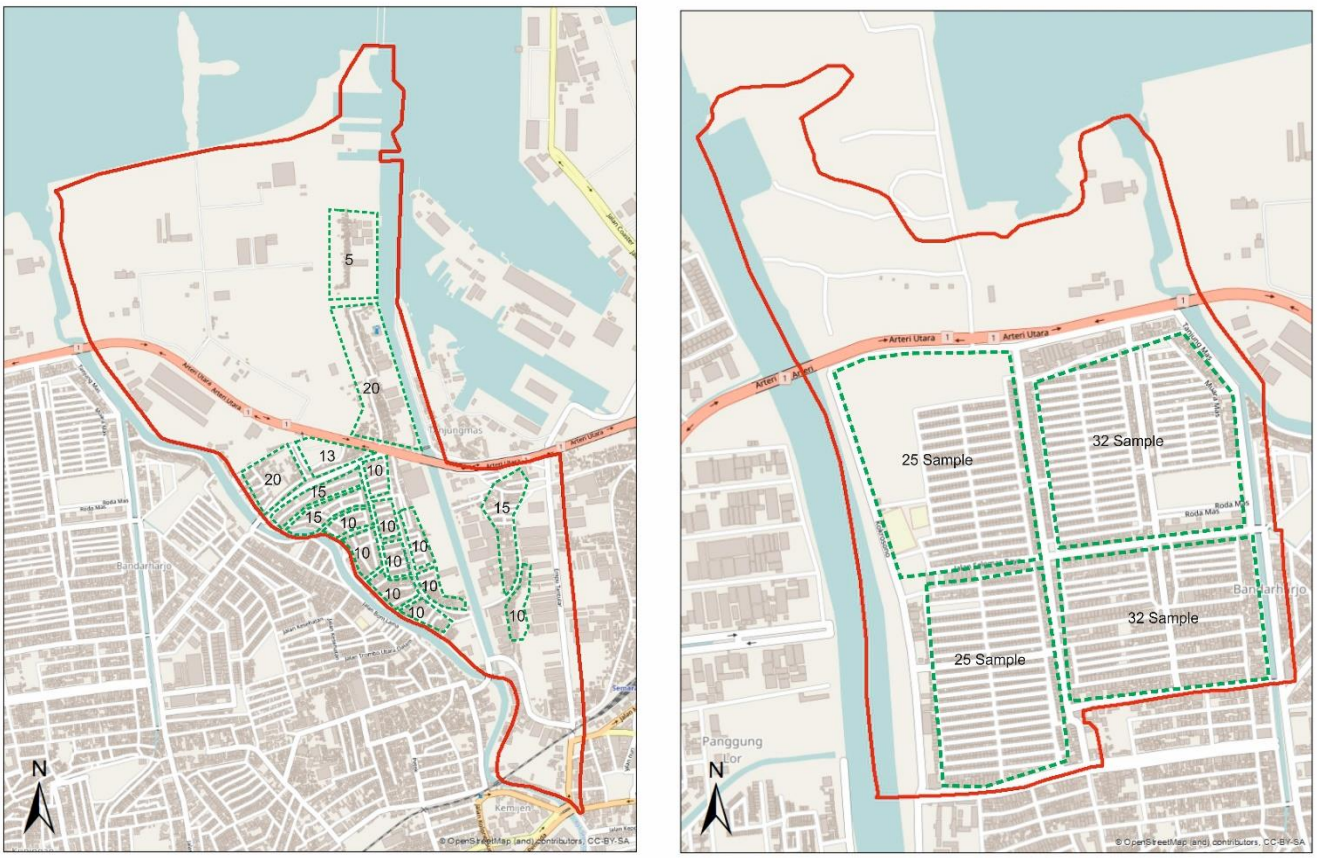


Figure 6 Sample distribution strategy

3.2. SURVEY IMPLEMENTATION

The fieldwork lasted from Monday, October 3rd 2016 to Friday, October 28th 2016. The first week of field survey spent for handling survey permit and prepare the household survey. The deprivation analysis was edited with new data about slum and poverty to get the final decision of the selected neighbourhood. The questionnaire was refined by testing it to several respondents around home and made the online version to test the result for people outside the selected neighbourhood. After the questionnaire was refined, it was ready to distribute to the selected neighbourhood in the following week.

3.2.1. HOUSEHOLD SURVEY

The household survey aimed at finding information about the internet access and use and interaction of people with e-government service. The household survey started Saturday, October 8th 2016 and was conducted until Monday, October 17th 2016. Before going to the field, there was a discussion with the surveyor about the questionnaire distribution, explanation and testing questionnaire among them. There were three surveyors who help in the household survey. One surveyor was handled Panggung Lor which has less sample and the other two surveyors was handled Bandarharjo which has more household sample. Before going to the field, each surveyor should read the questionnaire and interviewed each other to get better understanding of the questionnaire. After the discussion, it was resulted that each surveyor could understand and it wasn't needed to refine the questionnaire. On Saturday, October 8th 2016, with all surveyors, the pilot survey was conducted in the Panggung Lor and Bandarharjo. The purpose of the pilot survey was to know which part of the question needed to be refined and to calculate the time for each questionnaire. There were six questionnaires for pilot survey which were two questionnaires was distributed in Panggung Lor and another were distributed in the Bandarharjo. The respondents were pick up during the pilot questionnaire was different with respondent for the main survey. From the pilot survey, it can be known that it was need 15-20 minutes to fill the questionnaire included the small introduction and small chatting. In the questionnaire was clearly state that person who could be respondent in a household should had age between 18 – 65 years old and the surveyor need to interview them directly to make the question was clearly understand. The pilot survey was conducted in the morning and after discussion about the execution of the pilot survey, the fixed survey was continued in the afternoon until evening.

There was limitation in this field survey because most of the household of the Panggung Lor only available in the weekend or in the night time because most of them working in the office or formal sector. The field survey for Panggung Lor was maximize in the weekend or during evening time. Conversely, because most of the household in Bandarharjo are working in informal sector so the time for household survey was more flexible and could be happen during the day. Moreover, not all the household in both neighbourhood were willing for the interview, even in one part of the Panggung Lor were difficult to get respondent because the house was empty or they were not willing to have interview.

Besides to fill questionnaire, the surveyor should have made point in the map in each of the sample they pick up. This method was useful to make sure that the sample was distributed evenly like in the sampling design map. Every day, the surveyor had to collect the filling questionnaire to be input in excel file. The surveyors also need to make report for every problem or difficulties in the field. The result of sample distribution in Bandarharjo can be seen in Figure 7 while for Panggung Lor can be seen in figure 8.

3.2.2. SECONDARY DATA COLLECTION

The secondary data collection was collected before going to field and during the fieldwork. The data that have collected before the field survey was recent year (2014) PODES data because the data could be request from the statistical office website. Potensi desa (PODES) or potential village data in English is a dataset which contains information about the neighbourhood related to socio-economic condition, environment, disaster information, land use, security, culture, etc. The other data was statistical book of Semarang which could be downloaded from the statistical office website. During the field survey, the water service company service, local planning agency

office, and the public relation office of city government have visited and from each office, we got the data useful for the research. The detail of the collected data can be seen in the table 5.

Figure 7 Distribution of household sample and neighborhood condition in Bandarharjo

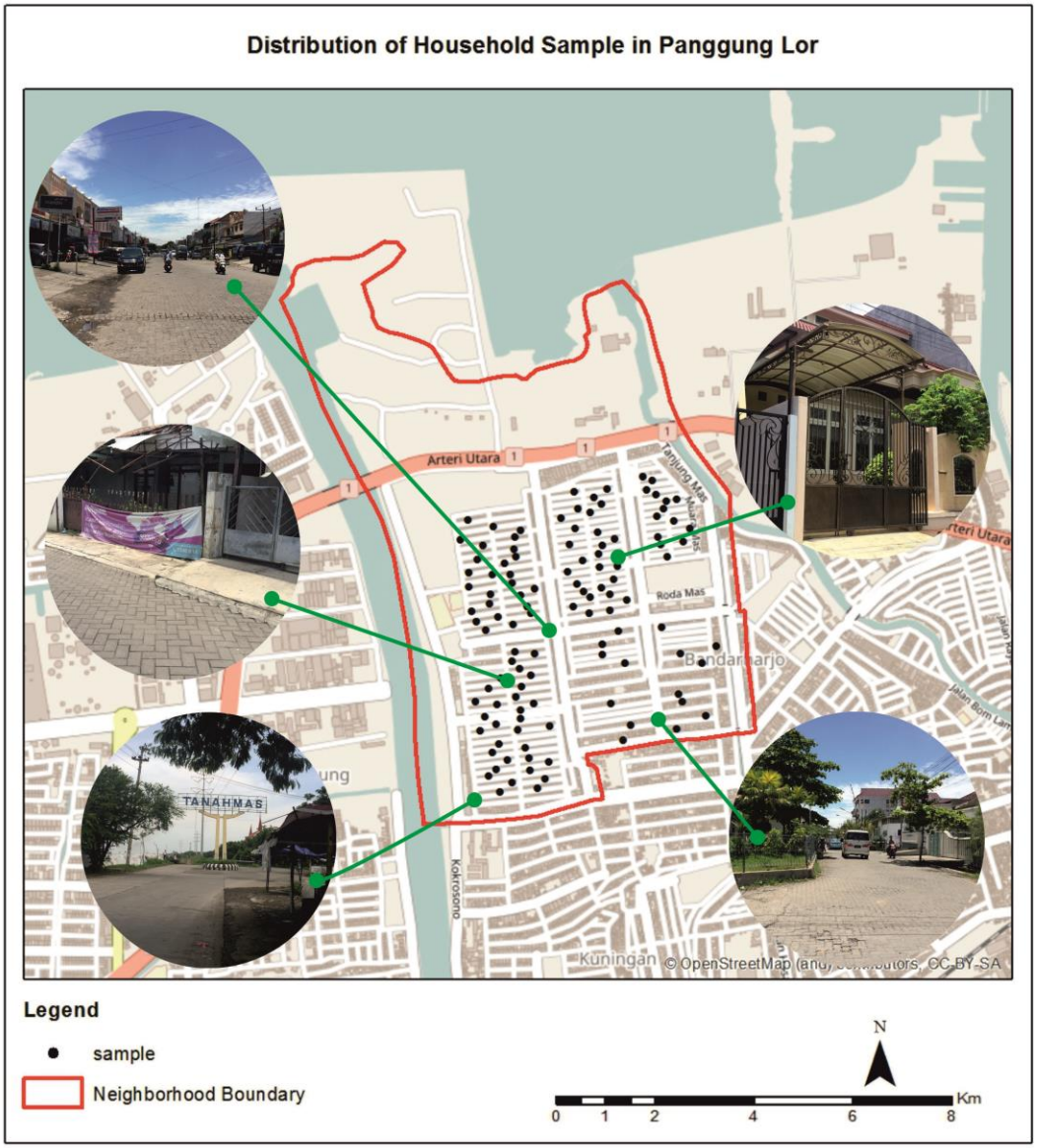


Figure 8 Distribution of household sample and neighborhood condition in Panggung Lor

Table 5 Collected secondary data

Collected Data	Sources	Year
Demographic data	Statistical Office Website	2014
Census tract data in individual and neighbourhood level (SUSENAS and PODES)	Statistical Office Website	2014
The poverty data	Planning and Development Agency Office (BAPPEDA)	2015
Map of Semarang City	Planning and Development Agency Office (BAPPEDA)	2010
The location of slum	City Planning Office (DISTAKO)	2015
Map of water service area	Water Service company office (PDAM Tirta Moedal)	2010
Twitter complain for water service in September 2016 (without using platform lapor.go.id)	Water Service company office (PDAM Tirta Moedal)	2016
Satellite Imagery of Semarang City	Diponegoro University	2009
Water service complaint using platform lapor.go.id (SMS, twitter, and website) since May – October 2016	www.lapor.go.id, Public relation office of Semarang City	2016

3.3. DATA ANALYSIS AND DATA PROCESSING

This thesis will use several analyses to answer the research question and address the research objective. The software such as ArcGIS and SPSS will be used for analysis. Mainly, ArcGIS will be used to map the pattern of deprivation and to map the distribution of water service complaint from e-government. Meanwhile, the SPSS will be used to analyse data from questionnaire after the data have been processed and ready for the next analysis.

3.3.1. THE SPATIAL PATTERN OF DEPRIVATION ANALYSIS

The spatial pattern of deprivation analysis was conducted in several steps. First, I needed to determine the type of indicators use for analysis according the literature review and data availability. For the next step, it need to make the index of multiple deprivation based on the chosen indicators and show it spatially in the map. Because the index was constructed in each neighbourhood, so it has possibility to show the pattern in the map.

In constructing the multiple deprivation index (IMD), it need to normalize the chosen data before using it for calculation which is better to use continuous data for calculating the index of multiple deprivation. The normalization can be done by knowing the function of each indicators which was distinguished into 2 function: benefit and cost. Benefit means that the indicators contribute positively to deprivation and increasing the deprivation while cost means that the indicators contribute negatively to the deprivation and decreasing the deprivation. In benefit calculation for normalization, it need to know the highest, lowest and range of the value and then calculate it by using formula: (value-lowest value)/(range). The similar calculation is treated as same way as benefit but it need to take the inverse of the outcome. In this research, all indicators were treated as benefit because they make increase in deprivation. After value normalization, it need to determine weight for each indicator. In here all indicators were treated by the equal weight so all values in each indicator is summed and then be divided by number of indicators for the final index.

After getting the multiple deprivation index, it need to bring it to the ArcGIS to see the distribution value using a boxplot. Boxplot was useful here for making index classification because it was classified the index into different class according its value. The index classification can be used to show the spatial pattern of deprivation. basically, the neighbourhood with lower score would classified as non-deprived neighbourhood and the neighbourhoods with higher score would classified as deprived neighbourhood.

3.3.2. THE RELATIONSHIP OF DIGITAL DIVIDE AND DEPRIVATION ANALYSIS

The relationship of the digital divide and deprivation can be identified from questionnaire data, so it need to clean and process the questionnaire data before using it for analysis. Before data processing, it needed to check the data to maintain the quality. During inputting the data from questionnaire to excel form, it needed to recheck all the answers from the questionnaires to make sure that each questionnaire was complete. For the missing answer, the surveyor was asked to know the reason of missing answer. Every questionnaire was coded based on the point in the map and labelled according the label in the questionnaire. Every point from the map transferred into ArcGIS using same code with the questionnaire. Afterwards, the excel data had to join with ArcGIS point to see the distribution of the sample. Excel data also have been saved in SPSS for the further analysis.

It need to change the question in questionnaire to be variables which can be read and analyse in SPSS. Accordingly, it need to code the answer of each question and change it to be dichotomous or nominal variable type. One question can have more than one variable if it allows multiple answer. Every yes/no answer change to dichotomous variable and for the question which need to choose one option, it changes to ordinal variable. The question which has answer in number also be modified into nominal variable and have been coded according the rank. In total, there are 63 variables from 29 questions. It was also added one variable related to deprivation which is if the respondent came from Bandarharjo, so it would code in 0 as deprived neighbourhood and if the respondents came from, Panggung Lor, it would code in 1 as non-deprived neighbourhood. Similar treatment also applied for yes/no

answer. The code will be given in 1 for yes answer and 0 for no answer while another variable with single option will be coded as nominal, ordinal or interval variable. The detail variable can be seen in the annex 2.

To know the relationship between the deprivation and the digital divide, first it need to determine the digital divide dimension and variable to measure digital divide dimension in questionnaire. Secondly, it need to know the Internet access and use in both neighbourhood according the digital dimension from the questionnaire. since the questionnaire was collected in the household level, so it will be interesting to know how the household characteristic influence in accessing and using the Internet. The explanation of the Internet access and use will be done at neighbourhood and household level by using crosstab to show the correlation between the variables, primarily between household or neighbourhood type with the Internet access and use.

There are two ways to see the correlation between variables: first with chi-square and second with the correlation value. Since most of the variables are categorical data so chi-square test is useful to use in this case to see how strong the association between variable. The correlation will work well with the interval data but it was not right to explain type of association of categorical data especially for binary and nominal data. For reporting the chi-square test, it need to know the chi-square value and the significant level (*p*). It would reject the null hypothesis which assume that the two variable is independent if the significant level value is less than .05 but before moving to chi-square value, it need to the expected frequency in cross tab table. All expected frequencies should be greater than 5 but if the expected frequency less than 5, it need to collect more data to try boost the proportion of cases falling into each category. To test the strength association, it need to give additional statistic test such as phi and Cramer's V. If both variables only have two categories, so the score for phi and Cramer's V are identical, but if one of the categories had more than two categories, so that the Cramer's V is more useful than phi. To know the type of association (positive or negative), it is important to show the P correlation value.

3.3.3. THE INFLUENCE OF THE DIGITAL DIVIDE AND DEPRIVATION TO THE E-GOVERNMENT ACCESS ANALYSIS

For the water service complaint from public relation office or website lapor.go.id, it was processed by copy the complaint one by one from the website to know how much case was solved and in process. Every complaint had spatial information such as address and location which was mentioned by the complainant in complaint, for example X wrote that he had problem about water continuity in Y location. By helping of google earth, I could discover the neighbourhood name and then wrote it down in the excel form. After that, it need to calculate number of complaint in every neighbourhood and transferred it into ArcGIS for visual reason. Since the city government had joined with the lapor.go.id on May 2016, it was only possible to capture 109 complaints of water service from May 2016 to January 2017 and not all the complaints had spatial information. The complaints from twitter that did not use the platform lapor.go.id couldn't be analysed because the mechanism to treat the complaints was not clear.

After knowing the number of complaint of each neighbourhood, it need to know the association with deprivation. In here, the correlation test can be used to test the association between the deprivation and number of complaints. Since the complaints are only for water service complaint, so the deprivation data which will be used here is the data which limit to the area with water service from water company. From 170 neighbourhoods, only 93 of it have provision from water service company.

The complaints distribution could also be seen by incorporating it with water service quality map to see the condition of complaints area. Since I don't get the GIS version of water service quality area map, so I have downloaded from PDAM website and then I used graphic software such Corel Draw to make comparison between complaints distribution and water service quality area. I was recorded in Excel the type of water service quality in each neighbourhood with complaints and then calculated the proportion of complaints or neighbourhood in each water service quality areas level.

Lastly, the relationship of digital divide and deprivation with e-government access can be known by describing it qualitatively based on previous results about the digital divide, deprivation, and access to e-government service for water service complaint.

4. STUDY AREA

This chapter provides a general overview of the study area. It starts with aa general description of Semarang followed by the study area in Bandarharjo and Panggung Lor, the Internet access and use in Semarang, and the general description of e-government service for monitoring public service. For the study area description, I will focus on the description about demographic and living conditions while the internet access and use in Semarang city will be explained based on mobile phone, laptop/PC, and the Internet possession, type of device to connect internet, type of place to connect internet, and type of the Internet usage. The last subsection describes the e-government service that have been used in Semarang to monitor public services.

4.1. GENERAL DESCRIPTION OF SEMARANG

Semarang is the capital city of Central Java Province and one of the biggest cities in Indonesia. Administratively, Semarang has 16 districts with 177 neighbourhoods. In 2015, the total population in Semarang was over 1,5 million people with the population growth of 0,65 % which makes Semarang one of the metropolitan cities in Indonesia. Around 71.55 % of population in Semarang have productive age between 15-64 years old. The most popular job in Semarang is industrial worker (25.65 %), followed by those working as civil servants (13.76 %), construction workers (12.02 %), service and others (11.86 %), and farmers (3.95 %). Figure 9 shows the Semarang city as study area.

According data from BAPPEDA (2015) about the calculation of poor people, 20,82 % of total population in Semarang is living in poor conditions with 39 households/105 people classified as very poor, 17.336 households/55.485 people classified as poor people, and 97.564 households/313.258 people classified as almost poor. For the slum location, data from the Semarang government for slum location indicates that Semarang has 62 slum located in 62 neighbourhoods and with a total area of 415,83 Ha. To improve slum conditions, the Semarang government allocated a budget for Kampung (slum in Indonesia) Improvement Program in the selected area.

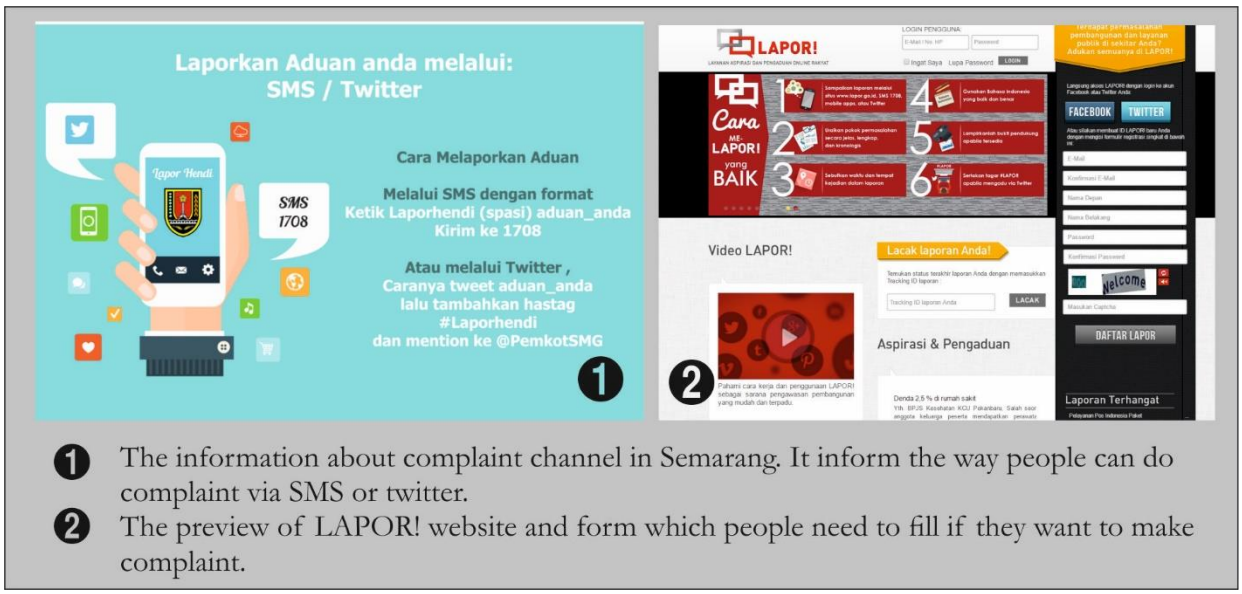
Nowadays, large cities in Indonesia are trying to improve their economic condition by implementing several programs toto prepare them to face the challenges that emerge locally and globally. One of the programs which is implemented in Semarang is the smart city program. Following that program, Semarang has created the slogan "Be Smart City" (Based on E-government, Semarang More Accountable, Realistic, and the Transparent City). With that slogan, in mind, the city authorities in Semarang try to digitalize the government information by building a cyber application on administration, information, public service, licensing, marketing, and city planning. In 2015, Semarang has awarded the smart city award by the Smart Nation Award (ISNA). The award motives the city to do more for being a smart city and for the improvement of the city.

In supporting the implementation of the smart city, the city government provides some public areas such as public parks with free wi-fi connection so people can access the Internet for free. In total, there are 20 public spaces with free wi-fi connection. Additionally, the wi-fi connection is also available in more than 300 places in Semarang city but for this connection people need to pay to get the access. The city government has signed a cooperation with the Indonesian telecommunication company PT. Telkom to provide wi-fi connection to the whole city area so that people can get access to the Internet at a cheap price or for free.

One tool that is being implemented to transform Semarang in a smart city is e-government services for public service complaints and improvements. In the past, people had difficulties to complaint anything related to public services and tended to be silence because they assume that complaining the government is something useless because the city authorities would not dodo something for improvement. Recently, the government has been realizing that the citizen's voice is important for the development of the city and useful in program monitoring and evaluation, so the city authorities have opened channels for public services complaints and for making

improvements according to the input or complaints from the citizen. In the digital era, the use of digital media is useful to facilitate information exchange so the e-government is considered as one of mediums for citizen complaints. To accommodate citizen complaint for public service in Semarang, the Semarang government is using e-government by partnering up with the national e-complaint system called LAPOR!. Since May, 2016 people can complaint by using this system through SMS, website, and also Twitter. Figure 10 shows the capture about complaint platform system in Semarang.

Figure 9 Study area (*Source : http://indonesia-orthopaedic.org/*)



1. The information about complaint channel in Semarang. It inform the way people can do complaint via SMS or twitter.
2. The preview of LAPOR! website and form which people need to fill if they want to make complaint.

Figure 10 Preview of e-government service for complaint platform in Semarang

4.2. GENERAL DESCRIPTION OF BANDARHARJO AND PANGGUNG LOR

Both Panggung Lor and Bandarharjo are in same district and same area, Semarang Utara (North Semarang) located in the coastal zone area. The neighbourhoods share similar characteristics namely the high density building and a high number of population. The differences are on the area planning, which is in Panggung Lor is more organized than Bandarharjo because the residential area in Bandarharjo was built by private developers. Furthermore, the infrastructure in Panggung Lor is more complete than in Bandarharjo because the private developer built it with decent infrastructure. The general description of both neighbourhoods will be presented below.

4.2.1. DEMOGRAPHY

The total population of Bandarharjo is 20.600, higher than in Panggung Lor which has only 14.093 people in their area. Bandarharjo has population density bigger than Panggung Lor since it has unorganized residential area with high density building. The proportion of men and women in both neighbourhood is almost similar. Percentage of people in working age (15-64 years old) is high in both neighbourhoods but the percentage of Bandarharjo is lower than Panggung Lor. Bandarharjo has higher percentage of people in age < 15 years old than in Panggung Lor. Most of people in Bandarharjo are working in the construction or industrial sectors with a low salary while in Panggung Lor most people are working as entrepreneurs or sellers. Jobs as fisherman are only found in Bandarharjo and in both neighbourhoods, no one works as a farmer or in the transportation sector. The demographic profile of both neighbourhoods can be seen in figure 11.

4.2.2. LIVING CONDITION

Even though both neighbourhood are closely located, they have different living conditions. According DISTAKO Semarang about the identification of slum area in Semarang, Bandarharjo has slum area as big as 33 Ha compare to Panggung Lor with no slum area. Slum area in Bandarharjo is being one of the big slum area in Semarang. The slum area in Bandarharho is followed by the high number of people living in poor condition with percentage of 62 % from total population while Panggung Lor only has 3 % people living in poor condition. By comparing the poverty condition in both area, it can be known that there are the differences of live condition of both neighbourhoods. In chapter 5, the differences of both neighbourhoods can be seen clearly from the deprivation analysis. The condition of both neighbourhood can be seen in figure 12.

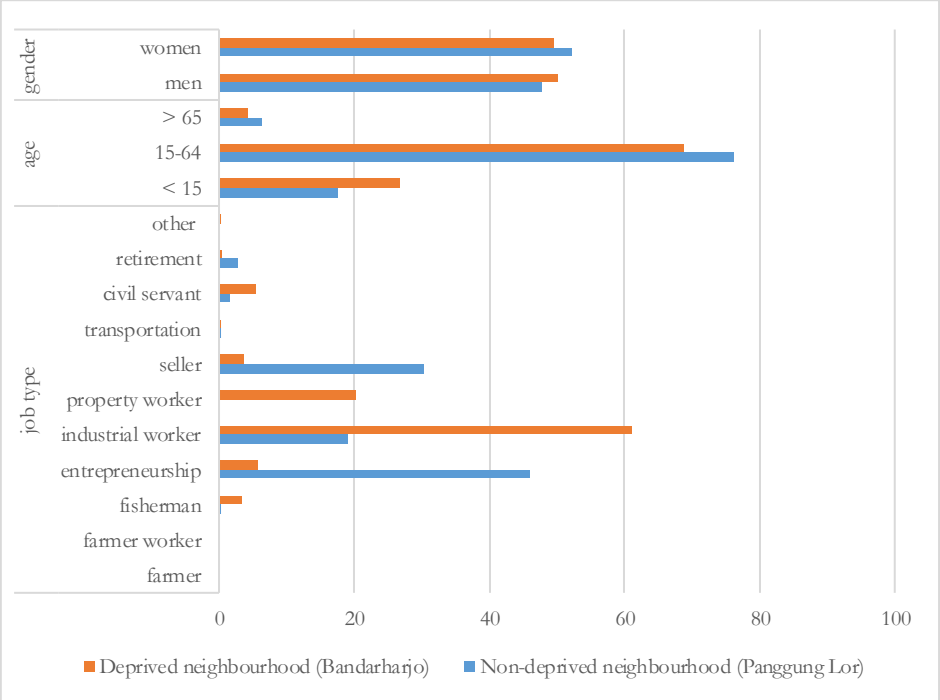


Figure 11 Demographic condition of study area

Figure 12 The condition of both neighbourhood (A) deprived neighbourhood (Bandarharjo) and (B) non-deprived neighbourhood (Panggung Lor) (*source: field survey*)

There are no big differences of infrastructure in both neighbourhood but since Panggung Lor was developed by private developer, the residential area in Panggung Lor is more organized than in Bandarharjo. The residential area in Bandarharjo has high density with small houses, different from the one in Panggung Lor. For basic infrastructure, such as water and waste management, both area areas are covered by provision from the city government. Since not all houses in Bandarharjo have their own toilet, the communal toilet can be found in several areas in the neighbourhood.

4.3. INTERNET ACCESS AND USE IN SEMARANG CITY

National social-economic census track data (SUSENAS) has some variable related to the Internet access and use at the city/municipal level. In total, there are six questions in SUSENAS which are related to the Internet access and use. From SUSENAS data in 2015 for Semarang city, with 3341 individual samples in 908 household, it shows that more than 60 % of the sample population have and use mobile phone. The mobile phone here includes the conventional mobile phone and the smart phone. The computer/laptop/tablet possession and use is lower than mobile phone, with less than 40 % respondents in Semarang having or using these devices. Internet access and use is similar to the use of computer/laptop/tablet because only less than 40 % of the sample has access to the Internet. Figure 13 show the use and possession of the digital media and Internet in Semarang.

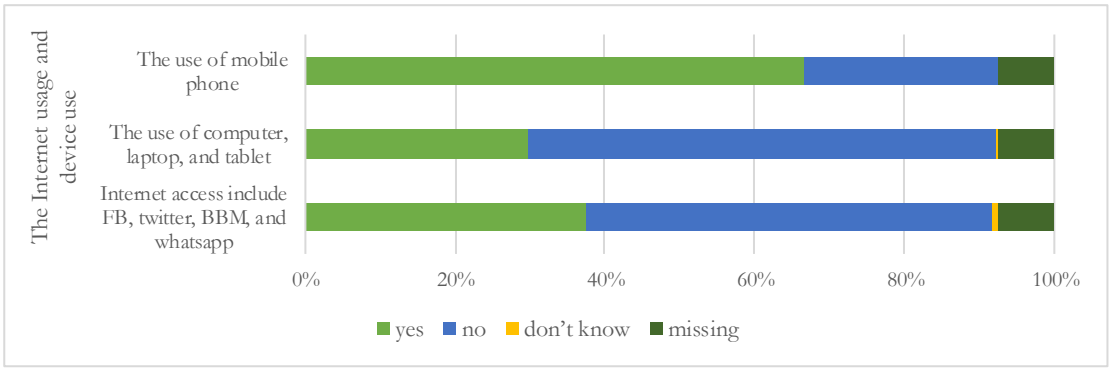


Figure 13 The use of digital device and Internet access in Semarang according SUSENAS 2015

From those people who have access to the Internet, most access it using mobile phone followed by laptop and PC. Since the mobile phone is popular among Indonesians, it is no wonder if this occurs also in Semarang. Most people are accessing the Internet at home followed by the working place and public places. For usage pattern,

people are accessing the Internet mostly for social media such as Facebook, Twitter, Instagram, etc. followed by finding information, entertainment, doing school homework. The use the Internet for online shopping or financial activities is less than other usages probably caused by the Indonesian culture, which is not accustomed with financial transaction through the Internet. People prefer financial transactions traditionally rather than using media such as the Internet. Figure 14 shows the usage pattern in Semarang.

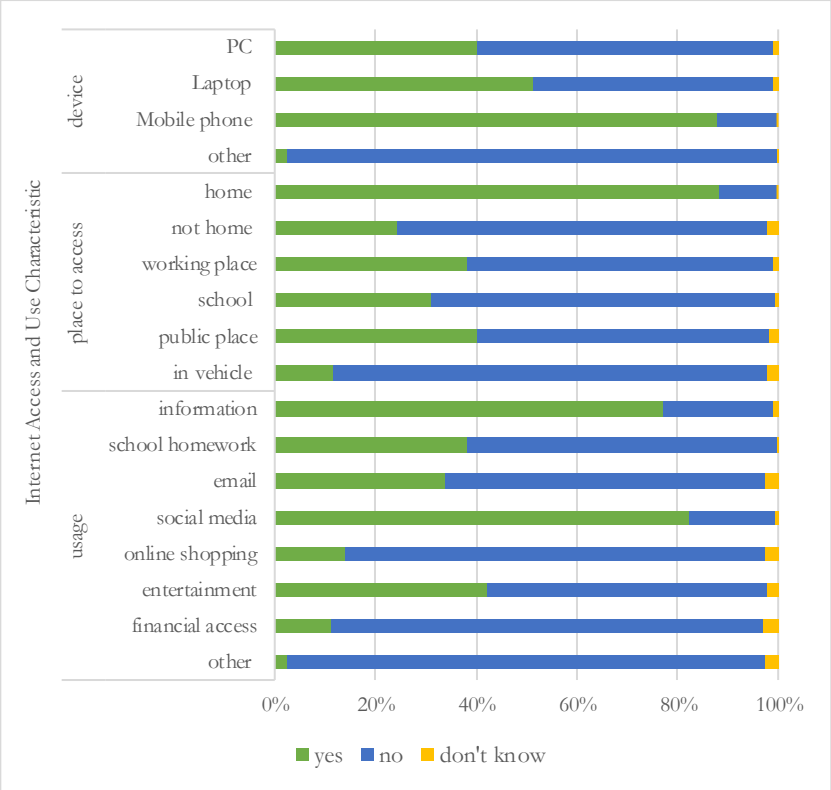


Figure 14 The Internet access and use in Semarang according SUSENAS 2015

4.4. THE E-GOVERNMENT SERVICE FOR MONITORING AND EVALUATING PUBLIC SERVICES QUALITY IN SEMARANG

Realizing the importance of the public participation, in 2011 Indonesia's government introduced the new style program: LAPOR! (Layanan Aspirasi dan pengaduan Masyarakat or means "report" in English), an online portal where the public can directly report their problem related to the public services, send their complaint related to the public servant, and monitor the government's development program. LAPOR was established by the Presidential Working Unit for The Supervision and Management of Development (UKP4) under deputy III mainly related to its function on monitoring national development programs, assisting the president in counter-measuring issues related to the government programs, and accommodating suggestions and complaints regarding the slowness of the government's programs.

Until April 2015, LAPOR! has over 290.000 registered users, receiving an average of more than 800 reports every day. LAPOR! is a form of e-government service in Indonesia and designed in an easy to use way so that anyone can access and use this program. The public can submit their complaint or problem via website, text message (sms), or mobile application which is available for blackberry, apple, and android. LAPOR! aims to increase public participation and information transparency in order to develop better public services.

The citizen can submit reports on LAPOR! by using several media including websites in https: www.lapor.go.id, SMS (to 1708) and also mobile applications. LAPOR! also has an anonymous feature, in case the informant wants their identity to be protected. The report is subsequently verified in advance by the administrator of REPORT! for clarity and completeness, and subsequently forwarded to the related institutions at least 3 working days after the reporting is done. The report is published automatically in the website so that everyone can access it. There is also a notification feature, which gives the user a progress report of their complaint. The report handling mechanism can be seen in figure 15.

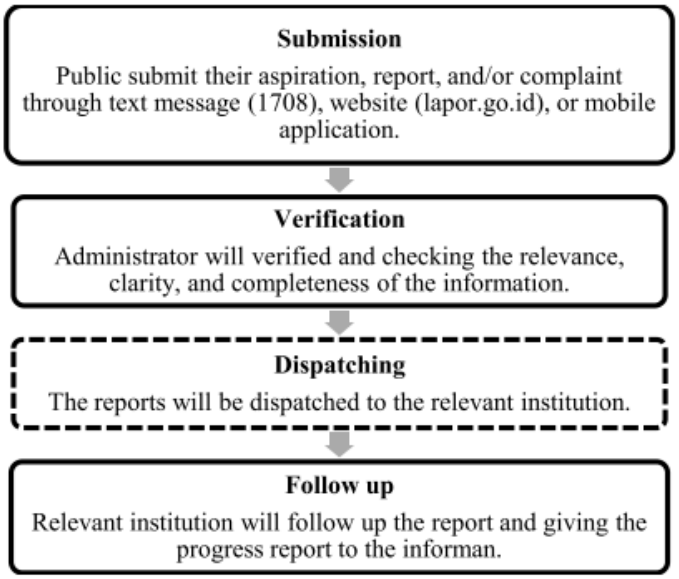


Figure 15 Report handling mechanism on LAPOR! (*source: Izzati (2013)*)

There are three stages on the LAPOR! mechanism: reporting, follow up, and closure. In the reporting stage, the citizen needs to submit a report via the website, text message or mobile application. To check the relevance and clarity of the information, the report will be verified by the administrator and if the report passes the verification, it will be directed to the relevant government institution. Next, in the follow up stage, LAPOR! publishes every report that has been forwarded to the relevant government institutions, and sends the user continued notifications. According the Public Service Law in Indonesia, there is a maximum of 60 days for the government to solve the problem related to the public services but in LAPOR! the government institution has at least 5 working days to do internal coordination and respond to the complaint. The last stage is closure of the report which means that if the government institution has responded to the complaint or solve the complaint, the report will be marked as complete report in LAPOR!. After the report is finished, the complainant can give response answered the feedback from the related organization within the space of 10 working days. if not follow-up is sent by the complainant, then the report will be closed automatically by the system.

5. RESULT AND DISCUSSION

This chapter explains the results and findings from the field survey and data analysis that correspond with the research objectives and questions. The first sub chapter discusses the patterns of deprivation, which include the indicators of deprivation that are appropriate to include in light of the local context and spatial patterns of deprivation in the urban areas. The second sub chapter focuses on the relationship of deprivation with digital divide, and on the explanation of the Internet access and use in both neighbourhood. The last chapter considers the influence of deprivation and digital divide on the use of e-government services, which includes the household interaction with the e-government services for water service complaints and the influence of the digital divide and deprivation in the e-government access for water service complaints.

5.1. PATTERN OF DEPRIVATION IN URBAN AREAS

The pattern of deprivation can be made by using the index of multiple deprivation (IMD) on deprivation indicators. The deprivation indicators can be determined based on literature which be adapted to local context. The ArcGIS is used to map the pattern of deprivation of urban areas by making classification for the index of multiple deprivation.

5.1.1. THE INDICATORS OF DEPRIVATION

The indicator of deprivation here is determined based on the literature review about deprivation which has been explained in chapter 2. The indicator of deprivation here is adjustable based on local context in Semarang. According Pacione (2009), poverty is main indicator of deprivation following with cause and effect of the poverty as multiple deprivation indicators. The data limitation in chapter 3 explain the data availability and according those, not all indicators explained in literature can be used in analysis. There are several indicators mentioned by Pacione (2009) such as poverty and poor housing which are available in the data. The poverty data which publish by Semarang Planning Agency (BAPPEDA) was determined by several individual and household indicators such as basic consumption, income, house quality, assets and education. By adopting local context, the occupation type with low income such as fisherman, farmer, and industrial worker are being one of indicators of deprivation. Data about infrastructure can't be used here because the type of data is binary. In total, there are six indicators for analysis where four indicators related to job type, one indicator related to environment, and one variable related to the poverty. Table 6 shows the detail of indicators of deprivation. In the index of multiple deprivation is need to have data with continuous variable, since not all data is not continuous type, so only several indicators and data that can be used in IMD construction.

Table 6 Dimension and indicator for IMD analysis

No	Indicators of deprivation according to the literature review	Data Type	Source
1	People working as farmer	Continuous	Statistical report in district level 2014
2	People working as farmer worker	Continuous	Statistical report in district level 2014
3	People working as fisherman	Continuous	Statistical report in district level 2014
4	People working as industrial worker	Continuous	Statistical report in district level 2014
5	Proportion of slum area	Continuous	BAPPEDA 2014
6	Proportion of poor household	Continuous	BAPPEDA 2014

5.1.2. THE PATTERN OF DEPRIVATION

In the IMD construction, it needs to normalised indicators first and set the function for each indicator, whether it will have cost and benefits function. In this case, all of the indicators which have been used for IMD construction are having benefit function. It means that the high value of each indicator will contribute positively to the deprivation. The indicators and given function of indicators can be seen in table 7 while the IMD calculation after variables normalization can be seen in annex 4.

Table 7 Indicators used in IMD construction

Indicators	Description	Function	Rationale
People working as farmer	Percentage of people having job as farmer	Benefit	The farmer in developing countries, especially in Indonesia, usually suffer from poverty because they still manage their land traditionally and after crop, they don't have good managerial skill to sell the product so they should sell to broker with lower price. The higher percentage of people working as farmers, the higher the deprivation.
People working as farmer worker	Percentage of people having a job as farmer worker.	Benefit	The farmer worker is different to farmer because they don't have their own land and should work for other people who have farmland, with low payment or with a shared system. The higher this indicator the higher the deprivation.
People working as fisherman	Percentage of people working as fisherman	Benefit	In Indonesia, fishermen have a similar condition with the farmer because most of them are traditional fishermen and do not use big boats to catch fish. High percentage of fisherman in a neighbourhood means that the neighbourhood has a high number of low income people. The higher percentage of this indicator the worse the deprivation.
People working as industrial worker	Percentage of people working in factory or manufactory	Benefit	People who have job in the manufacture sector as worker usually have low salary and high working hours. The high percentage of this job in a neighbourhood the worse the deprivation.
Proportion of slum area in each neighbourhood	Percentage of slum are in each neighbourhood	Benefit	The slum area is related to the poverty problem. The high percentage of slum area in a neighbourhood will be worsening the deprivation.
Proportion of poor household	Percentage of household living in poverty in each neighbourhood	Benefit	Semarang has been calculating the number of people or household living in poverty by using several poverty indicators. The high percentage of poor people in a neighbourhood also will be worsening the deprivation.

To map the pattern of deprivation, first, I needed to calculate the multiple deprivation index and next, this index can be shown spatially because it has spatial reference of each neighbourhood. ArcGIS is used here to show the pattern of deprivation and help in making deprivation class. By using boxplot in ArcGIS, it can be known that there are five classification for deprivation index in Semarang; 1st, 2d, 3rd, 4th quartile and upper outlier. There is no class for lower outlier because all of deprivation index are below the lower fence. Figure 16 shows the boxplot of deprivation index with the outlier value in the upper fence. Neighbourhoods located in the upper outlier mean that they have high value in deprivation index and are the most deprived neighbourhood while the deprivation index value which fall to 1st quartile to 3rd quartile become as non-deprived neighbourhood.

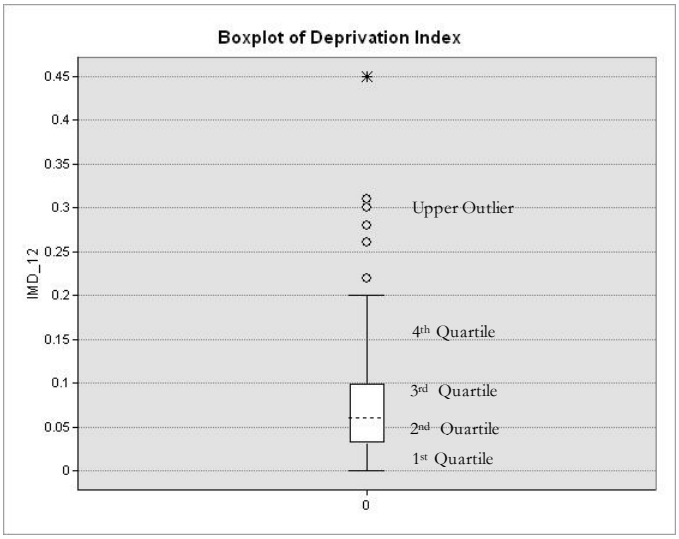


Figure 16 Boxplot of index of multiple deprivation

Classification of boxplot help me to make it easy to show the pattern in the map and calculate the number of neighborhood in each class. Table 8 shows the detail of each class include the number of neighborhood, minimum value, and maximum value. the 3rd quartile class has highest number of neighborhood compare to other class. Figure 17 shows the spatial pattern of deprivation in Semarang.

Table 8 Result deprivation index mapping

Class	Number of Neighbourhood	Minimum Index	Maximum Index
1st Quartile	42	0	0.02
2nd Quartile	37	0.03	0.05
3rd Quartile	56	0.06	0.1
4th Quartile	36	0.11	0.2
Upper Outlier	6	0.22	0.45

The spatial pattern of deprivation from the analysis result is similar with the spatial pattern of deprivation from Directorate of Settlement Development, Ministry of Public Work of Indonesia. The spatial pattern of deprivation from the institution only shows the pattern from one indicator of deprivation. The spatial pattern of deprivation from the Directorate of Settlement Development, Ministry of Public Work can be seen in Figure 18.

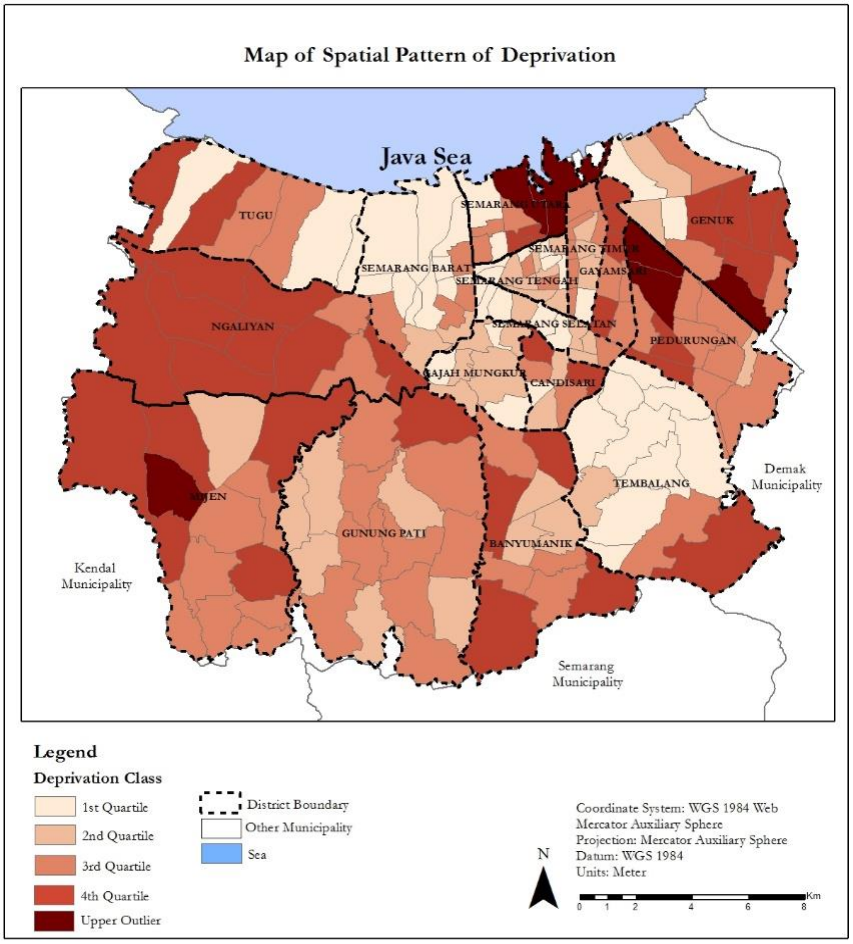


Figure 17 Pattern of deprivation in Semarang

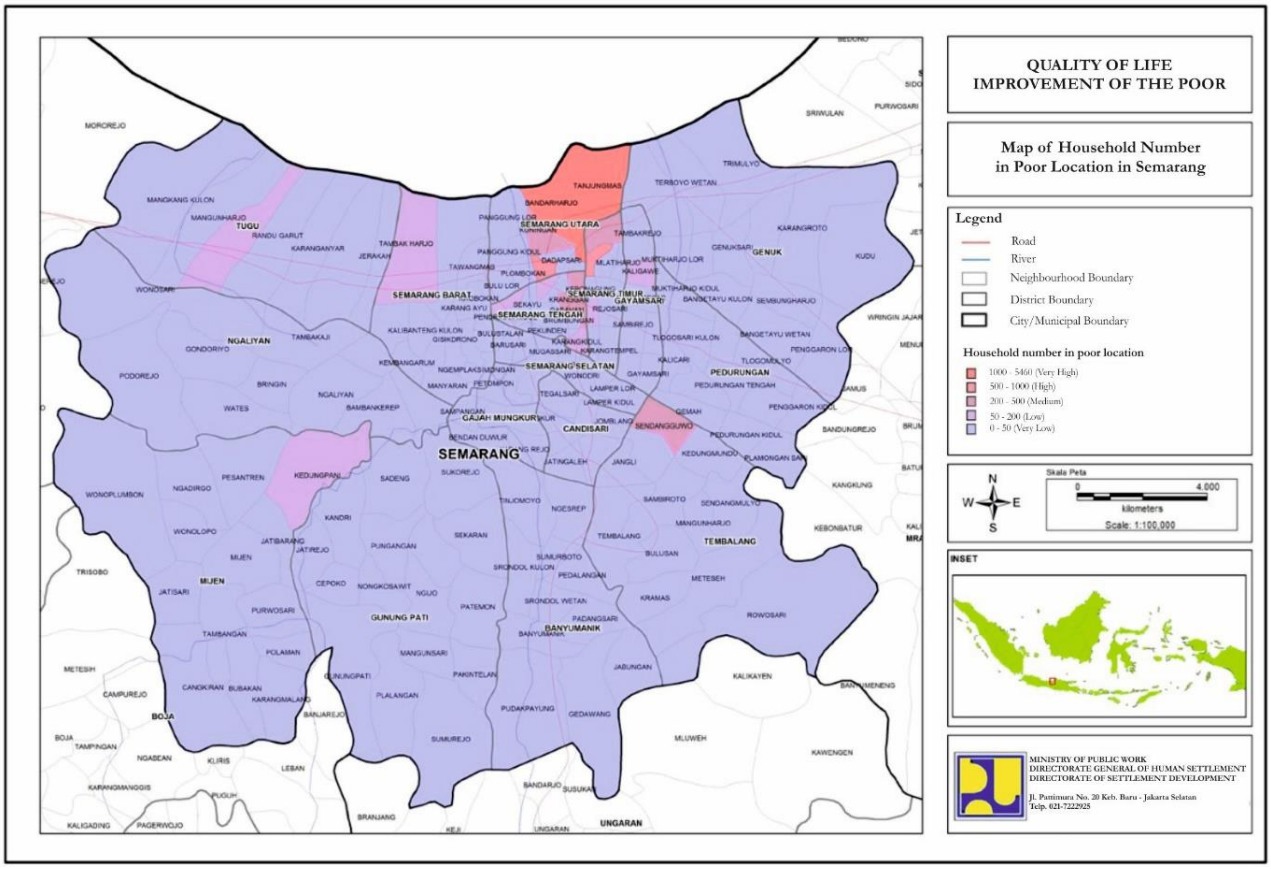


Figure 18 Spatial pattern of deprivation according to Ministry of Public Work and Public Housing
(*Source: Ministry of Public Work and Public Housing (2011)*)

One of the criteria in the selection of neighbourhoods for study area is availability of water provision from water service company. Since not all neighbourhoods have water provision from water service company, so this criterion is needed because the mechanism of complaints in the e-government is for provision for water service company. Even though possible to have complaints to make complaints about water outside from water company but mostly complaint about that related to environmental problem, law, or policy because the complaints are usually to report illegal deep ground water drilling. Figure 19 shows the distribution area of water service from water service company.

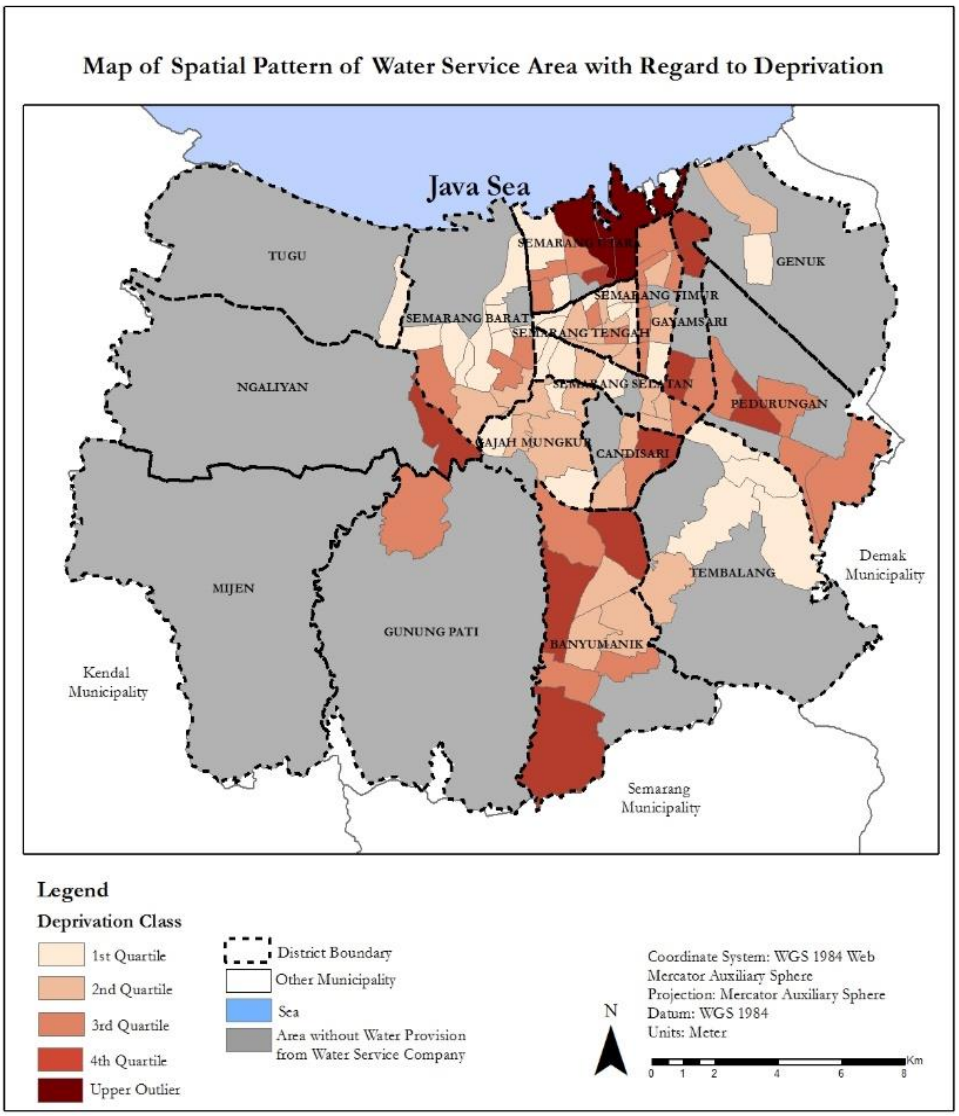


Figure 19 Map of water service area toward deprivation

With the water service criteria, it will limit the number of neighbourhoods which can be selected for study area. From 177 neighbourhoods, only 93 neighbourhoods have possibility to be chosen as study area. Table 9 shows the number of neighbourhoods in each class after reduction. There are only two neighbourhoods in upper outlier class; Bandarharjo and Tanjung Mas.

Table 9 The number of neighbourhood in each class after reduction

Class	Number of Neighborhood	Minimum Score	Maximum Score	Minimum Household Number	Maximum Household Number
1st Quartile	30	0	0.02	524	6115
2nd Quartile	26	0.03	0.05	381	5997
3rd Quartile	25	0.06	0.1	1392	5723
4th Quartile	10	0.11	0.2	2023	5890
Upper Outlier	2	0.3	0.45	4054	7503

5.2. THE RELATIONSHIP OF DEPRIVATION WITH THE DIGITAL DIVIDE

The discussion of this chapter will be started with explanation of the dimension of the digital divide and variables used to explain the digital divide, the discussion of characteristic of the Internet access and use in deprived and non-deprived neighbourhood, and in the last is the conclusion about the relationship between deprivation and the internet access and use.

5.2.1. THE DIMENSIONS OF DIGITAL DIVIDE

As mentioned in the literature review, there are four dimension of the digital divide. In this research, these dimensions were useful as primary element in designing the questionnaire for primary data collection. The four dimensions of the digital divide are motivational, material, skills and usage. Van Dijk (2005) called the four dimensions of the digital divide as successive kinds of access to digital technology, computers, and Internet connections.

The first dimension or access is related to the motivation to use the digital technology which is translated into the motivational access. The second dimension is related to the possession of computers and Internet connections or permission to use them and their content and called as material access/dimension. The third dimension is related to possession of digital skills, operational, informational, and strategic or called as skills access. The last dimension is related to number and diversity of application and usage time or called as usage access. the variable that have been used in this research can be seen in table 10.

Table 10 Dimensions of digital divide and variable that have been used in the research

Dimension	Internet access and use variables
Motivational	a. The importance of the Internet b. The reason why the Internet is not important
Material	a. The availability of Internet access in home b. Type of Internet access in home c. Money spent for the internet d. Type device at home e. Internet access outside home f. Place to access the Internet outside home g. Type device used outside home
Skills	a. Device ownership or familiar with b. Familiarity with smartphone application c. Familiarity with laptop/PC software
Usage	a. Reason use of the Internet b. Frequency in using the Internet c. The application which used frequently

5.2.2. THE CHARACTERISTIC OF INTERNET ACCESS AND USE IN BOTH NEIGHBORHOODS

This research is focused in looking the differences of the Internet access and use in two neighbourhood. The explanation about the characteristic of the Internet access and use starts from the explanation about respondent profile in the questionnaire following by the characteristic of the Internet access and use in both neighbourhood and household characteristic. Since this sub chapter is mostly using questionnaire data for analysis, so the summary of questionnaire data result from SPSS can be seen in Annex 3.

A. Respondent characteristic profile in the questionnaire

There are six categories representing the respondent profile in the questionnaire: respondent gender, respondent age, respondent household size, occupation of the head of household of respondent, education level of head of household of respondent, and household income of respondent. Gender and age are the categories at the individual level and correspond to the respondent information, while household size, occupation, education level, and household income are categories which correspond to respondent household characteristic. The total respondent sample is 318 which is divided to Bandarharjo with 204 sample and Panggung Lor with 114 sample. For highlighting the differences between two neighbourhoods, so the term of non-deprived and deprived will be used to explain the characteristic differences in two neighbourhoods. The non-deprived neighbourhood refers to Panggung Lor and deprived neighbourhood refers to Bandarharjo.

By comparing the respondent profile categories in the household level, it can be seen that non-deprived neighbourhood has better socio-economic condition than deprived neighbourhood. The differences in income, education level, and type of job of household from sample population portray the socio-economic condition in both neighbourhood. Figure 20 shows that the respondent characteristic of sample which is represented by age, gender, household size, education level head of household, job type head of household, and income level head of household.

For gender, the percentage of male respondent in non-deprived neighbourhood is higher than in the deprived neighbourhood. The proportion of respondent age in two neighbourhood is almost similar with the most frequently occurring response of age in both neighbourhood is between 36-45 years old. The most frequently occurring response for the household size in both neighbourhood is 3-4 person which the higher proportion is in non-deprived neighbourhood but deprived neighbourhood has higher proportion than non-deprived neighbourhood for the household size more than five persons. For the type of head of household job, the most frequently occurring response is service/other with the higher proportion in non-deprived neighbourhood. Deprived neighbourhood has higher percentage of household with low paid job such as fisherman, low paid construction worker, street vendor, etc. The proportion of education level of head of household in senior high school and university is higher in non-deprived neighbourhood than in deprived neighbourhood. Respondent in deprived neighbourhood has high proportion of head of household with low education level (no formal education and junior high school) and low proportion in high education level (university).

For the income level, deprived neighbourhood has higher proportion of low income household (below three million rupiahs or equal to below 200 euro per month). Conversely, non-deprived neighbourhood has higher proportion of household with high income level (above three million rupiahs per month or equal to above 200 euro per month). None of the respondent in deprived neighbourhood response that their household have income more than six million rupiahs (equal to 400 euro per month). In deprived neighbourhood, most of household have big household size with low income level. It means that household need to maintain large family member with small income.

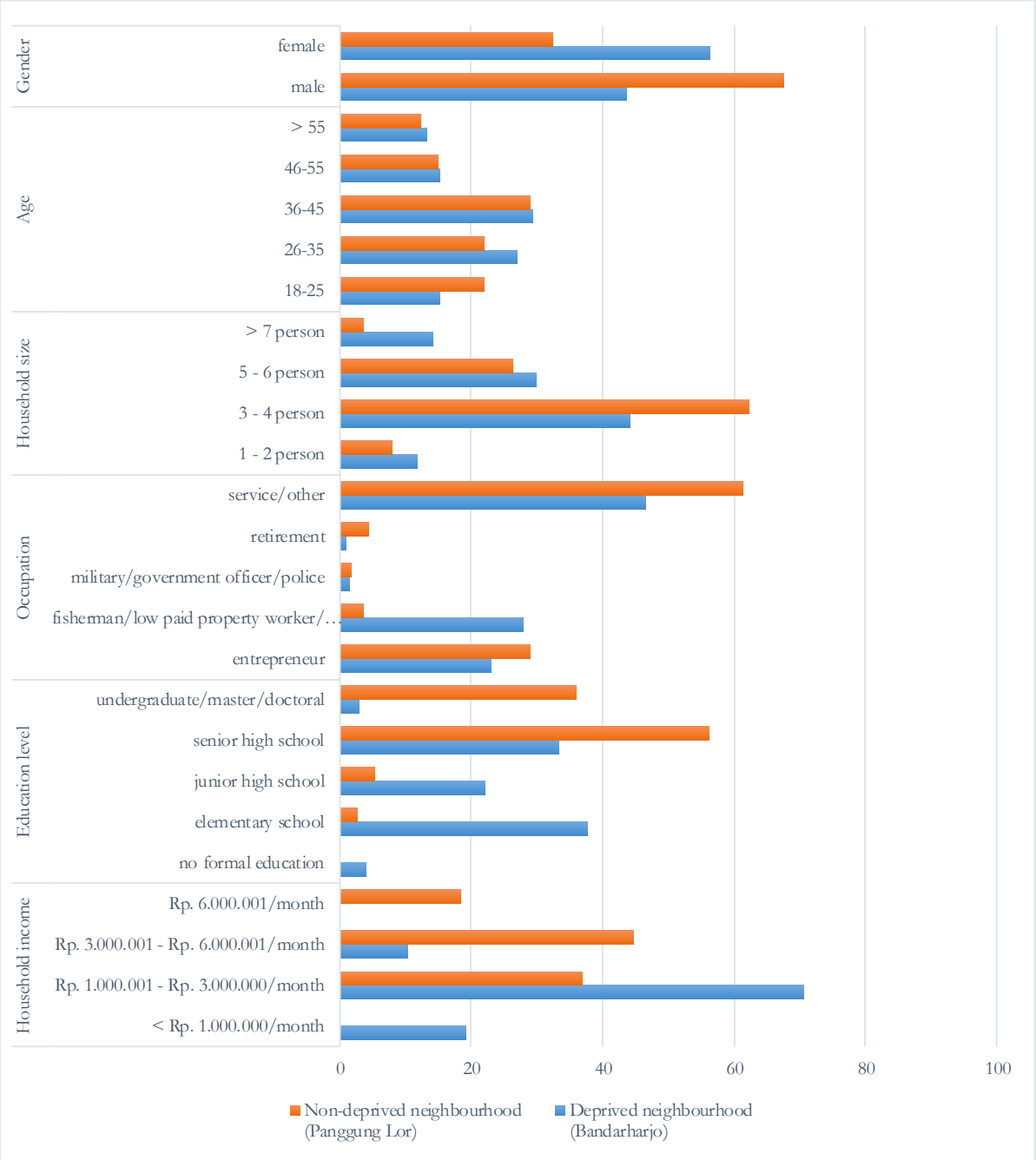


Figure 20 Respondent profile in both neighbourhood

B. The Internet Access and Use in Both Neighbourhood

Van Dijk (2005), in his book about the digital divide, discuss the digital divide according to differences in personal and positional categories. Personal categories are related to the individual characteristic such as gender, age, ethnicity, religion, etc. while positional categories are related to the position of the individual in the organization or community such as job, education, income, status in job, etc. Since this research will be focused on finding the differences of the Internet access and use in deprived and non-deprived neighbourhood, so the comparison will be based on deprivation but nothing related to the personal or positional categories. It is also important to see the difference of the internet access and use in household level especially in relation with the economic condition of household.

In the discussion of the Internet access and use, first, it need to discuss about the Internet access and use characteristic based on the digital divide dimension according questionnaire result and after that in the each of dimension, it need to see the association of the variables in each dimension with the household characteristic and deprivation. The household characteristic here is related to the economic condition of household because the economic condition of household is the most influence factor affecting the deprivation.

Motivational Dimension

Figure 21 shows the results for the motivational dimension from the questionnaire. Almost 100 %[1] of respondents in non-deprived neighbourhood answered yes when we asked about the importance of the Internet. Conversely, more than 60 % respondents in deprived neighbourhood responded that the Internet is not important. Most of the reason why it becomes not important is because of the affordability issue of the Internet serviced, followed by the lack of knowledge in using the Internet and loss of interest in using the Internet. Since it is possible to have multiple answers in the reason for why not using the Internet, it is possible that people do not like Internet because of more than one reason. The calculation the reason why people do not like the Internet is based on the respondents who response that the Internet is not important in their life. Interestingly, none of respondents gave as reason for not using the Internet because of privacy concern.

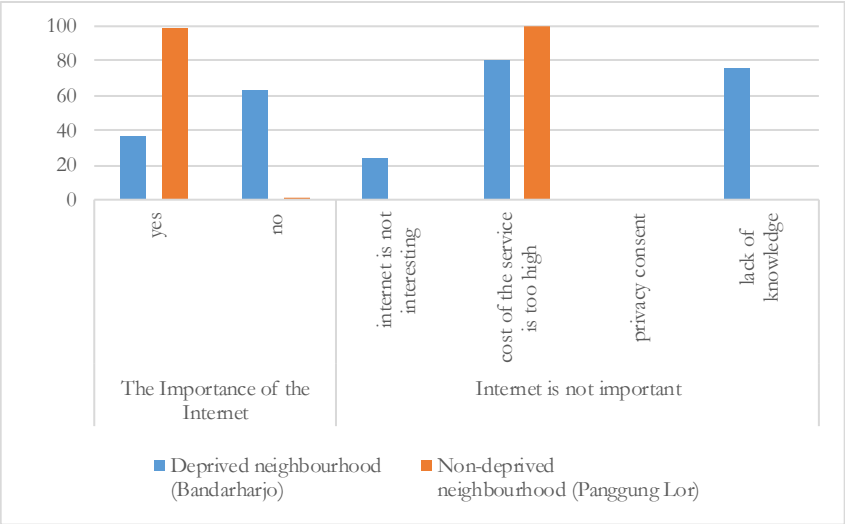


Figure 21 The motivational dimension profile in both neighbourhood

From the result, it can be known that the difference of people in both neighbourhood to perceive the Internet. Since most of people live in deprived neighbourhood is people with low economic ability, so the Internet is not the important need in their life because they are struggling to fulfil their basic needs such as food, clothes, and home. For them, the Internet is not affordable and one of the luxurious things in their life. Besides, most people in deprived neighbourhood doesn't know what the benefit from the Internet nor lacking the skills in using the Internet. Since the variables are binary variable so the relationship between motivational dimension variables with neighbourhood characteristic and household characteristic can be known by using crosstab analysis on SPSS to know the significance of association with Pearson chi-square test.

[1] Only one respondent in non-deprived neighbourhood (Panggung Lor) who respond that Internet is not important and the reason is price. It makes the percentage of reason price for non-deprived neighbourhood in figure 19 become 100 %.

Table 11 shows the association between neighbourhood and respondent household characteristic with the variable of the importance of the Internet among respondent. From the table, it can be known that there was a significant strong association between the deprivation and the economic condition of household with the importance of the Internet variable because the significant value is less than 0.05, no expected value less than 5 and the Crammer's V value is more than 0.5. It means that people who live in non-deprived neighbourhood or in household with good economic condition will have higher feeling of the importance of the Internet than people in deprived neighbourhood or living in household with lower economical condition.

Table 11 Pearson chi-square test between the importance of the Internet variable with neighbourhood and household income

		Deprivation	Household Income
The importance of the Internet	Pearson Chi-Square	117.665	95.204
	Asymp. Sig. (2-sided)	0.000*	0.000*
	Crammer's V	0.608	0.547
	Pearson Correlation	-0.608	0.528

*Note: * The correlation is significant with p < 0.05*

The association of the reason why the Internet is not important with deprivation and economic condition can be seen in Table 12. It can be known that the association of the household income with the reason of lacking interest to the Internet is not valid because the cross-tab table has expected value count less than 5. Both categories of deprivation and household income have association with Internet is not important reasons. The strong association with the Crammer's V value more than 0.5 shown by the category of deprivation with cost reason. The medium association with the Crammer's V 0.3 – 0.5 shown by the household income and deprivation categories with lack of knowledge and cost reason. The low association with Crammer's V 0.1-0.3 shown by category of deprivation with interest to the Internet. From the result, I can say that people who live in deprived neighbourhood and having poor family tend to have less interest, affordability problem and knowledge lacking to the Internet.

Table 12 Pearson chi-square test of the reason why the Internet is not important with socio-economic variable

		Deprivation	Household Income
Internet is not interesting	Pearson Chi-Square	19.195	25.575[a]
	Asymp. Sig. (2-sided)	0.000*	0.000
	Crammer's V	0.246	0.294
	Pearson Correlation	0.246	-0.268
Cost of the service is too high	Pearson Chi-Square	83.009	59.357
	Asymp. Sig. (2-sided)	0.000*	0.000*
	Crammer's V	0.511	0.432
	Pearson Correlation	0.511	-0.419
Lack of knowledge	Pearson Chi-Square	79.160	57.290
	Asymp. Sig. (2-sided)	0.000*	0.000*
	Crammer's V	0.499	0.424
	Pearson Correlation	0.499	-0.411

*Note : * the correlation is significant with p < 0.05*
a. the association is not valid because it has cells with expected count less than 5

Material Dimension

The explanation about material dimension will start from the access to the Internet at home and outside home followed by the detail of the access at home and outside home. For the Internet access at home, it need to know about type of connection and type of device use and for the Internet access outside home, it need to know about type of device and place to get connection. In here, it is also interesting to know about amount the spending money for the Internet access at home or outside home.

Almost 100 % of respondent in non-deprived neighbourhood have Internet access at home and about half of respondents who have the Internet access in home, also have the Internet access outside home. Conversely, only 39 % of respondents in deprived neighbourhood have Internet connection in their home and only 12 % of them also have access outside home. Five percent of respondent in deprived neighbourhood only access Internet outside home, means that they don't have access at home. Figure 22 shows the proportion of the respondents who have the Internet access in home and outside home compared to the total respondents in each neighbourhood.

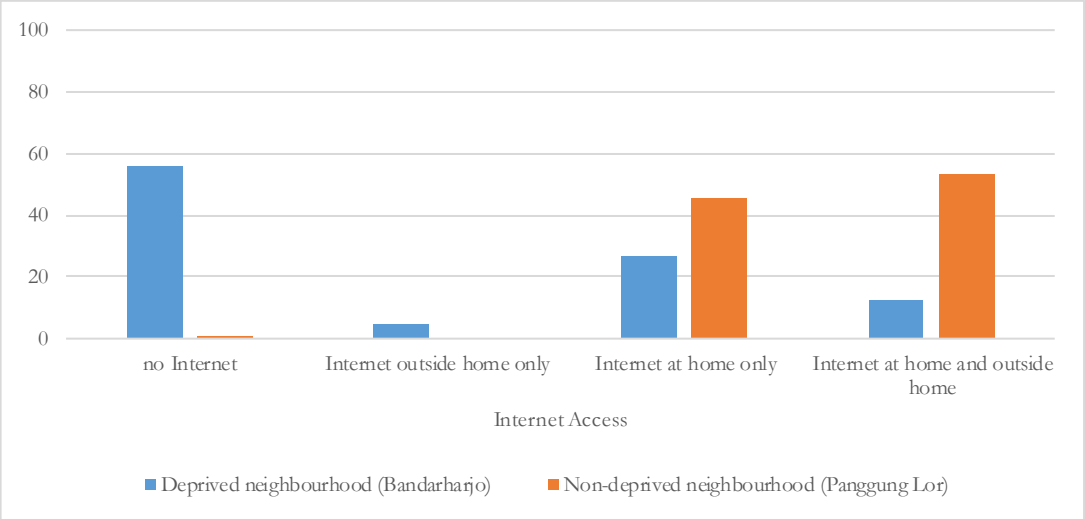


Figure 22 The Internet access in both neighbourhood

It can be seen in Table 13 that both of categories has strong association with the access of the Internet at home. The medium association is shown by both categories with the Internet access outside home. It means that in the non-deprived neighbourhood and in the higher income household, people tend to have Internet access at or outside home than people in deprived neighbourhood or living in lower income household.

Table 13 Pearson chi-square test of the Internet access at home and outside home with the deprivation and household income

		Deprivation	Household Income
The Internet access at home	Pearson Chi-Square	110.015	86.417
	Asymp. Sig. (2-sided)	0.000*	0.000*
	Crammer's V	0.588	0.521
	Pearson Correlation	-0.588	0.518
The Internet access outside home	Pearson Chi-Square	45.856	54.178
	Asymp. Sig. (2-sided)	0.000*	0.000*
	Crammer's V	0.380	0.413
	Pearson Correlation	-0.380	0.413
*Note : * the correlation is significant with $p < 0.05$*			

By looking the type of connection, it will be known that the mobile broadband connection is popular as type of Internet connection at home in both neighbourhoods while the possession of fix narrowband connection is higher in non-deprived than deprived neighbourhood. The popularity of mobile broadband connection among people in both neighbourhoods is in accordance with the data from SUSENAS (2015) and news from TheJakartaPost (2015) about the popularity the use of mobile phone among people in Indonesia, or particularly in Semarang. After getting result about the type of devices which have been used to get Internet connection at home and outside home in both neighbourhood, it seems the result is confirming the data about smartphone popularity among Internet users in Indonesia or Semarang. Since the fix narrowband connection is higher in non-deprived neighbourhood, a private communication provider has built the strong network for whole neighbourhood.

There is not too much different in both neighbourhoods in the Internet spending but respondents in non-deprived neighbourhood spend more money to get Internet access than deprived neighbourhood. The proportion of spending money more than Rp. 100.000 (equal to 7 euro) for the Internet in non-deprived neighbourhood is higher than deprived neighbourhood. In deprived neighbourhood, only 11 % people spend their money in equal amount for the Internet. It shows in the figure 23 that the spending money for the Internet in deprived neighbourhood is decreased following the amount of the Internet. Conversely, with the similar amount, the spending is increased in non-deprived neighbourhood.

As can be seen in figure 23, there is differences among the place and devices used of the connection outside home in both neighbourhoods. Open free wi-fi places are popular for the respondents in non-deprived neighbourhood and cybercafé/café is the most popular place for respondents in deprived neighbourhood. Consequently, laptop/PC is a more popular device to connect to the Internet for respondents in deprived neighbourhood than in non-deprived neighbourhood, because some respondents in deprived neighbourhood went to the cybercafé regularly to get access to the Internet. These are corresponding to the fact that in deprived neighbourhood, 5 % of respondents have internet access outside home only.

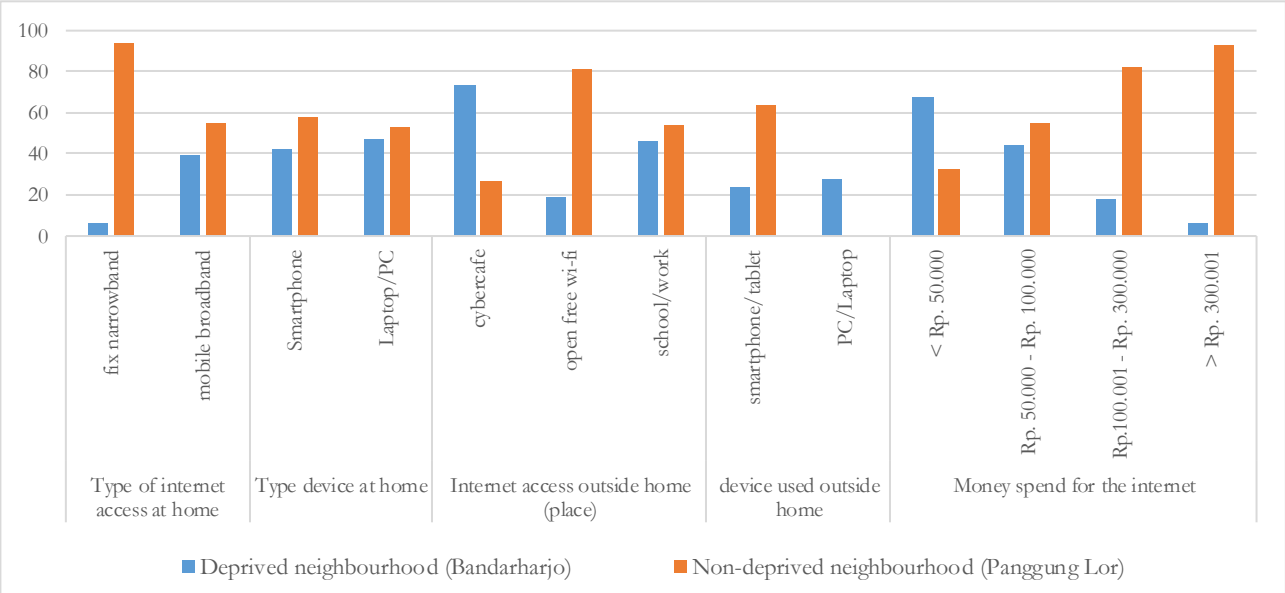


Figure 23 The detail profile of Internet access at home and outside home in both neighbourhood

Table 14 shows the correlation result between deprivation and economic condition of household categories with the material dimension variables. Some variables are not significant or valid having association with the deprivation and household income. People in non-deprived neighbourhood tend to have both type of the Internet access, fix narrowband and mobile broadband because the variable of Internet type is correlated negatively with deprivation. The mobile broadband connection is related to household income which the higher household income, the higher possibility of people having mobile broadband connection. The similar association also shown by fix narrowband

connection category but association is not valid because the crosstab calculation result of household income and fix narrowband possession is having expected value less than 5 so the association can't be interpreted from this result.

For the money spend for the Internet variable, both deprivation and household income have influence to the money spend for the Internet. People in non-deprived neighbourhood tend to spend more money to the Internet than people in deprived neighbourhood. Higher income household also tend to spend more money for the Internet than lower income neighbourhood. Considering that having the Internet connection is important nowadays, household or people with better economic condition will like to spend their money for the Internet access.

For type device at home, there is association between the deprivation and household income categories with the smartphone possession. People who live in non-deprived neighbourhood or in higher income level tend to have smartphone as device for getting Internet connection at home. Another device such as laptop/PC has weak negative correlation with the deprivation but not with the household income because it has expected value less than 5. It means that laptop/PC is being popular device used to access Internet at home.

People in non-deprived neighbourhood or living in higher income household tend to like having the Internet access outside home which is in open free wi-fi. Semarang has 20 spot in public park and over 300 in public space with wi-fi connection but people still need to pay to get wi-fi connection access. Even though the price is not expensive (around 40 cent euro for 6 hours' access) but still people without money, device, and knowledge can't afford it. More than that, mostly the wi-fi areas are in the city centre (in the shopping mall, café, library, hotel, or public park), so people need transportation cost to get access from wi-fi connection areas. Smartphone/tablet is being popular device for getting Internet access outside home in non-deprived neighbourhood or higher income household because it has strong negative correlation with deprivation which means that in more deprived neighbourhoods, people are less likely to get Internet connection in wi-fi connection area and to use smartphone as device to get Internet connection outside home.

Table 14 Pearson chi-square between type of the Internet access at home, money spending for the Internet, place to get the Internet access outside home, and device used outside home with deprivation and household income

		Deprivation				Household Income			
		Pearson Chi-Square	Asymp. Sig. (2-sided)	Cramer's V	Pearson Correlation	Pearson Chi-Square	Asymp. Sig. (2-sided)	Cramer's V	Pearson Correlation
Type of internet access at home	Fix narrowband	82.413	0.000*	0.509	-0.509	84.596[a]	0.000	0.516	0.516
	Mobile broadband	91.336	0.000*	0.536	-0.536	67.413	0.000*	0.460	0.460
Money spend for the internet		30.300	0.000*	0.397	-0.394	53.098[a]	0.000*	0.304	0.435
Type device at home	Smartphone	91.336	0.000*	0.536	-0.536	77.609	0.000*	0.494	0.484
	Laptop/PC	4.836	0.028	0.123	-0.123	36.713[a]	0.000	0.340	0.327
Internet access outside home (place)	Cybercafé	1.456	0.228	0.068	0.068	7.280[a]	0.064	0.151	0.068
	Open free wi-fi	85.799	0.000*	0.519	-0.519	69.936[a]	0.000	0.469	0.454
	School/work	3.826[a]	0.050	0.110	-0.110	7.580[a]	0.056	0.154	0.125
Device used outside home	Smartphone/tablet	67.111	0.000*	0.459	-0.459	60.550	0.000*	0.436	0.422
	PC/Laptop	16.488	0.000*	0.228	0.228	8.455[a]	0.037	0.163	-0.021

*Note : * the correlation is significant with $p < 0.05$*

[a] the association is not valid because it has cells with expected count less than 5

Interestingly, the device used outside home of Laptop/PC is significantly correlated positively with people in deprived neighbourhood. This is happening because some respondent in deprived neighbourhood went to cybercafé regularly to get Internet connection because they don't have Internet connection at home. They prefer

to go to cybercafé because it available closely with their place than to go to the wi-fi connection area in city centre. Personal computer (PC) is usually available in cybercafé, so PC/Laptop will also correlate positively with the deprivation.

Skill Dimension

The explanation of the skill dimension here will related to familiarity of the people from different type of neighbourhood and household income level with the device used to get Internet connection, and software or application in those devices. The devices are distinguished into two type: smartphone and laptop/laptop with the most popular application or software from it. The skill to use smartphone is related to the knowledge operating the smartphone application such messaging (Whatsapp, BBM, Line, Skype, etc), social media (Facebook, Path, Twitter, Instagram, etc.), entertainment (games, Youtube, etc.), business (internet banking, online shop, etc), photo/video, and video call (Skype, Line, etc.). The skill to use laptop/PC is related to the knowledge operating laptop/PC software such work and productivity (Ms-office, email, etc), graphics (Photoshop, Corel Draw, video editing, etc.), explorer (Firefox, Google Chrome, Internet Explorer), and Entertainment (games, media player, and video player).

In research by van Dijk, the explanation of the skill dimension is more detailed and more related to the personal and positional categories, but this research will not explain further about skill dimension as van Dijk research. Since this research is focused on the differences of the Internet access and use in deprived and non-deprived neighbourhood and the household income, so the explanation about skill dimension here is more global. The focus of skill dimension here is related to the differences of global skill in using and operating device in different type of neighbourhood characteristic and household income level.

Figure 24 shows the type of devices which people are familiar to operate and use it and the familiarity with software and application in devices. From the total respondents who have access to the Internet in both neighbourhood, it can be known that the non-deprived neighbourhood has the high knowledge to use the smartphone than deprived neighbourhood. Meanwhile the deprived neighbourhood seems to more familiar to use and operate the laptop/PC than non-deprived neighbourhood. This is confirming the result about the popularity of cybercafé as place to get Internet in deprived neighbourhood. Among the respondents who familiar with smartphone in each neighbourhood, people in both neighbourhoods seem have similar familiarity with message, social media and entertainment application. Business applications, such as internet banking or online shopping, are familiar among respondents in non-deprived neighbourhood but photo/video application is more popular among respondents in deprived neighbourhood. For the software in laptop/PC, both neighbourhoods have similar familiarity with the familiar software use in Laptop/PC. Work and productivity software and explorer software are popular among users in both neighbourhoods. The graphic software such as Corel draw or Photoshop and entertainment software like game are more popular among users in deprived neighbourhood.

The knowledge in using devices to connect the Internet correspond with the type device used to get Internet connection at home and outside home. In both neighbourhood, people who are using smartphone respond that they are familiar with it. Conversely, for the knowledge in using Laptop/PC, only 72 % people who have laptop/device in non-deprived neighbourhood are familiar with it. It might be happened because people in non-deprived neighbourhood only use laptop/PC use at home and it doesn't mean that people have ability to use it. In deprived neighbourhood, 94 % respondents who use laptop/PC at home and outside home are familiar with it. It might be happened because people in non-deprived neighbourhood get the connection from cybercafé so they seem to more familiar with laptop/PC than people in non-deprived neighbourhood.

There is significant correlation between deprivation and household income with the skill dimension variable which can be seen in Table 15. The negative Pearson correlation score shows that people who live in non-deprived neighbourhood or living in higher income household are more familiar in using and operate smartphone than people who live in deprived neighbourhood or people who live in household with lower income level. Even though

the correlation score of deprivation and PC/laptop device is weak, but it shown that PC/Laptop is being more popular among people in deprived neighbourhood since people deprived neighbourhood like to go to cybercafé to get Internet connection. People in deprived neighbourhood or living in lower income household tend to less familiar or not using any device which is shown by the high positive Pearson correlation score with none type of device.

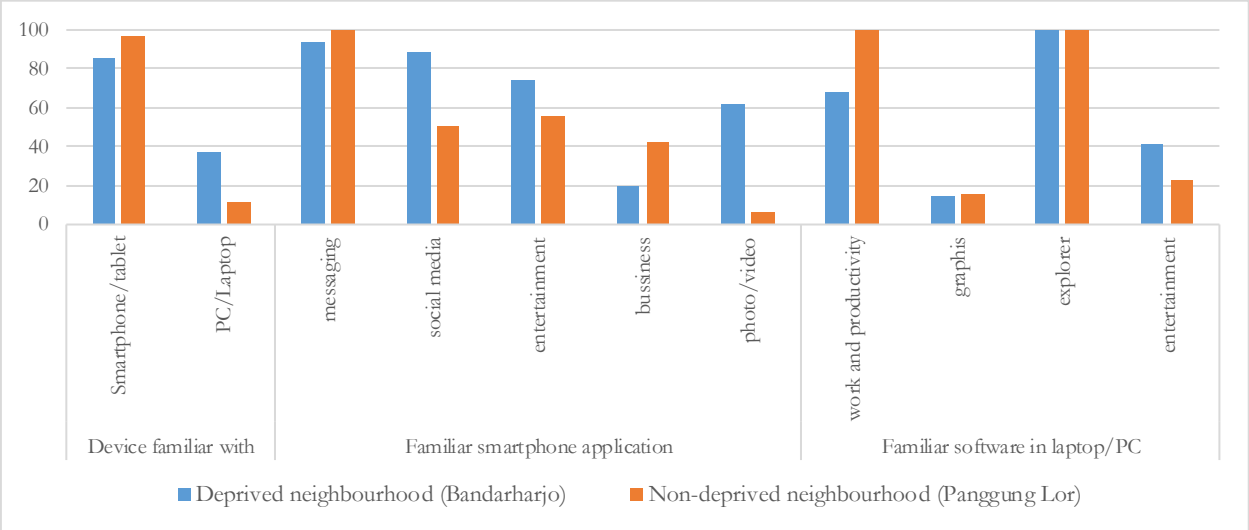


Figure 24 The familiarity with devices to access Internet and software/application in devices

Table 15 The familiarity of the devices to access Internet and application/software in device with deprivation and household income

		Deprivation				Household Income			
		Pearson Chi-Square	Asymp. Sig. (2-sided)	Crammer's V	Pearson Correlation	Pearson Chi-Square	Asymp. Sig. (2-sided)	Crammer's V	Pearson Correlation
Device used/familiar	Smartphone/ tablet	104.186	0.000*	0.572	-0.572	84.948	0.000*	0.517	0.495
	PC/Laptop	8.648	0.003*	0.165	0.165	9.074[a]	0.028	0.169	0.071
	None	95.292	0.000*	0.547	0.547	87.003	0.000*	0.523	-0.496
Familiar smartphone application	Messaging	118.864	0.000*	0.611	-0.611	86.120	0.000*	0.520	0.500
	Social media	23.459	0.000*	0.272	-0.272	50.858	0.000*	0.400	0.395
	Entertainment	20.485	0.000*	0.254	-0.254	36.100	0.000*	0.337	0.333
	Business	53.468	0.000*	0.410	-0.410	65.159[a]	0.000	0.453	0.429
	Photo/video	15.460	0.000*	0.220	0.220	4.332[a]	0.228	0.117	0.034
Familiar software in laptop/PC	Work and productivity	0.001	0.972	0.002	-0.002	19.658	0.000*	0.249	0.246
	Graphic	0.165[a]	0.685	0.023	0.023	5.413[a]	0.144	0.130	0.067
	Explorer	2.502	0.114	0.089	0.089	12.250[a]	0.007	0.196	0.188
	Entertainment	2.587	0.108	0.090	0.090	3.487[a]	0.322	0.105	0.075

*Note : * the correlation is significant with $p < 0.05$*

[a] the association is not valid because it has cells with expected count less than 5

For the correlation with the smartphone application, the deprivation is correlated negatively with smartphone application variable for entertainment, messaging, and social media but it is correlated positively with household income. Other variables of type of application use in smartphone such as for business, photo/video, and video

call are only correlated with deprivation. The business applications are popular among user in non-deprived neighbourhood than deprived neighbourhood. According the Pearson value, the type of smartphone application for photo/video and video call are popular among user in deprived neighbourhood than non-deprived neighbourhood but the correlation score is weak. From the explanation about the smartphone application with deprivation and household income, it can be generalized that people in non-deprived neighbourhood or living in higher household income will more familiar with smartphone application for messaging, social media, and entertainment, and business and less familiar with smartphone application for photo/video and video call.

The familiarity with the software in PC/laptop especially for working and productivity only correlated positively with household income. It means that people who live in higher income household will be more familiar using PC/Laptop application for working and productivity than people who live in lower income household.

Usage Dimension

The discussion of usage dimension here is related to the frequency in using Internet, the reason use of the Internet, and the type of application used when having access to the Internet. The type of applications here are related to message application such Whatsapp, Facebook messenger, Line, BBM, e-mail, etc; social media application such Facebook, Path, Twitter, Instagram, etc.; application for entertainment such Youtube, games, streaming media, etc.; business application such internet banking, online shop, etc.; and video call application such Skype, Line, etc..

It seems that people in deprived and non-deprived neighbourhood are having different preference in accessing Internet. In non-deprived neighbourhood, all respondents respond that they are accessing the Internet every day. Conversely, only 71 % of respondents in deprived neighbourhood have daily access to the Internet. About a half of respondents in deprived neighbourhood who aren't accessing the Internet every day, they are going to the cybercafé to have access to the Internet.

There is preference differences between deprived and non-deprived neighbourhood in the reason use of the Internet and popular application use in the Internet. Networking is being the most popular reason in accessing Internet in both neighbourhood. However, people in non-deprived neighbourhood are more likely to use Internet for valuable and productive purpose such as networking and business while people in deprived neighbourhood are more likely to use Internet for entertainment reason. For the type of application, the messaging applications are being the most popular application among the respondents following by the social media, and entertainment application. Corresponding with the reason use of the Internet and skill dimension in type of application and software use, the business application is being popular in non-deprived than deprived neighbourhood. The profile of usage dimension in both neighbourhood can be seen in Figure 25.

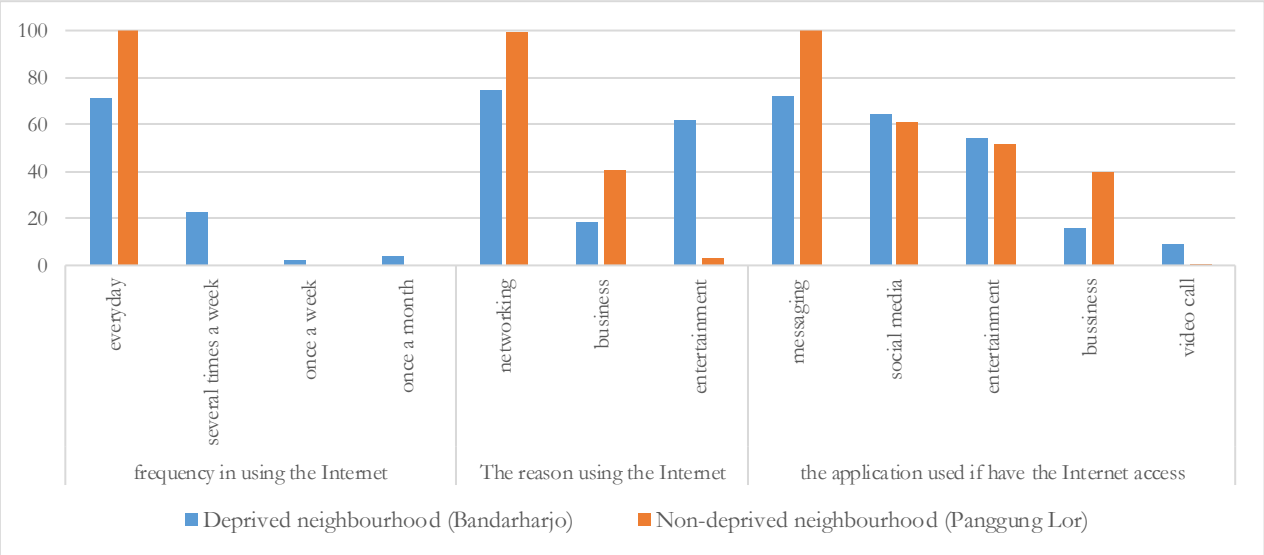


Figure 25 Usage dimension profile of both neighbourhoods

Table 16 shows the correlation between usage dimension variables with deprivation and household income. It shows that the significant negative correlation shows by the variable of frequency in using the Internet with deprivation. It means that people in non-deprived neighbourhood more frequent to use Internet than people in deprived neighbourhood. In both categories, reason use for networking is highly associated with deprivation and household income means that non-deprived neighbourhood or people living in higher income household will use the Internet for socializing with other people actively than people in deprived neighbourhood or living in lower income household. Another reason uses (business and entertainment) are only associated with deprivation but not with household income. People in non-deprived neighbourhood more actively use the Internet for business reason while people in deprived neighbourhood are more likely to use Internet for entertainment reason. Messaging, social media, business, and entertainment application are significantly associated with deprivation and household income. People in non-deprived neighbourhood or living in higher income household is having tendency to use those applications more when having Internet connection.

Table 16 The correlation score between usage dimension and socio-economic variable

		Deprivation				Household Income			
		Pearson Chi-Square	Asymp. Sig. (2-sided)	Cramer's V	Pearson Correlation	Pearson Chi-Square	Asymp. Sig. (2-sided)	Cramer's V	Pearson Correlation
Frequency	Frequency in using the Internet	37.020	0.000*	0.443	-0.387	14.148[a]	0.117	0.158	-0.187
Reason Use	Networking	127.140	0.000*	0.632	-0.632	85.715	0.000*	0.519	0.508
	Business	47.191	0.000*	0.385	-0.385	59.316[a]	0.000	0.432	0.414
	Entertainment	27.385	0.000*	0.293	0.293	9.786[a]	0.020	0.175	-0.066
Application used if have the Internet access	Messaging	134.254	0.000*	0.650	-0.650	86.231	0.000*	0.521	0.509
	Social media	31.405	0.000*	0.314	-0.314	45.889	0.000*	0.380	0.379
	Entertainment	23.628	0.000*	0.273	-0.273	39.997	0.000*	0.355	0.354
	Business	51.468	0.000*	0.402	-0.402	59.517[a]	0.000	0.433	0.413

*Note : * the correlation is significant with $p < 0.05$*

[a] the association is not valid because it has cells with expected count less than 5

5.2.3. THE RELATIONSHIP OF THE DIGITAL DIVIDE WITH THE DEPRIVATION

The discussion about the relationship of the digital divide and deprivation will start from the explanation about the Internet access and use differences in both neighbourhood followed by showing the type of relationship between the digital divide dimension variable with variable. In total, there are 36 variables which have been used to explain the Internet characteristic and use in both neighbourhood and showing the existence of the digital divide between two different neighbourhood class type and characteristic.

The previous chapter about the Internet access and use characteristic in deprived and non-deprived shows the digital divide existence in deprived and non-deprived neighbourhood which is represented from the characteristic of the digital divide dimension. The non-deprived neighbourhood is known having the Internet access and use better than the deprived neighbourhood. It is shown by the high number of people who feel that the Internet is important, high proportion of household with Internet access at home and outside home, the high money spending for the Internet access every month, the high number of household who have fix narrowband connection, the high familiarity with the smartphone device, having skill to use the Internet for valuable purpose such business and networking, and having daily access to the Internet. The differences of the Internet access and use in deprived and non-deprived neighbourhood can be seen in figure 26.

The relationship of the digital divide and deprivation can be proved by looking the number of digital divide variables which have correlation with deprivation, negative or positive. The positive correlation means that the higher value of variable, so it also will increase of deprivation level while the negative correlation means that the higher the value of variable so the lower the deprivation level. In total, there are 6 variables which don't have any correlation with deprivation, 21 variables which are correlated negatively with deprivation, and 8 variables which are correlated positively with the deprivation. It seems that most of the digital divide dimension variables are negatively correlated with the deprivation which indicated that the non-deprived neighbourhood has better access and use to the Internet than deprived neighbourhood. The positive correlation to the deprivation are shown by the reason of the unimportance of the Internet, laptop/PC as type of device used outside home, the familiarity with laptop/PC, the familiarity with none device, the smartphone application for photo and video call, and lastly, the reason use for entertainment. In here, laptop/PC as device used outside, beyond expectation, is correlated positively with the deprivation. It is happened because many people in deprived neighbourhood go to the cybercafé to get access to the Internet, as previous explanation in sub chapter 5.3.2 about the material dimension. Table 17 shows the relationship of the digital divide variables with the deprivation.

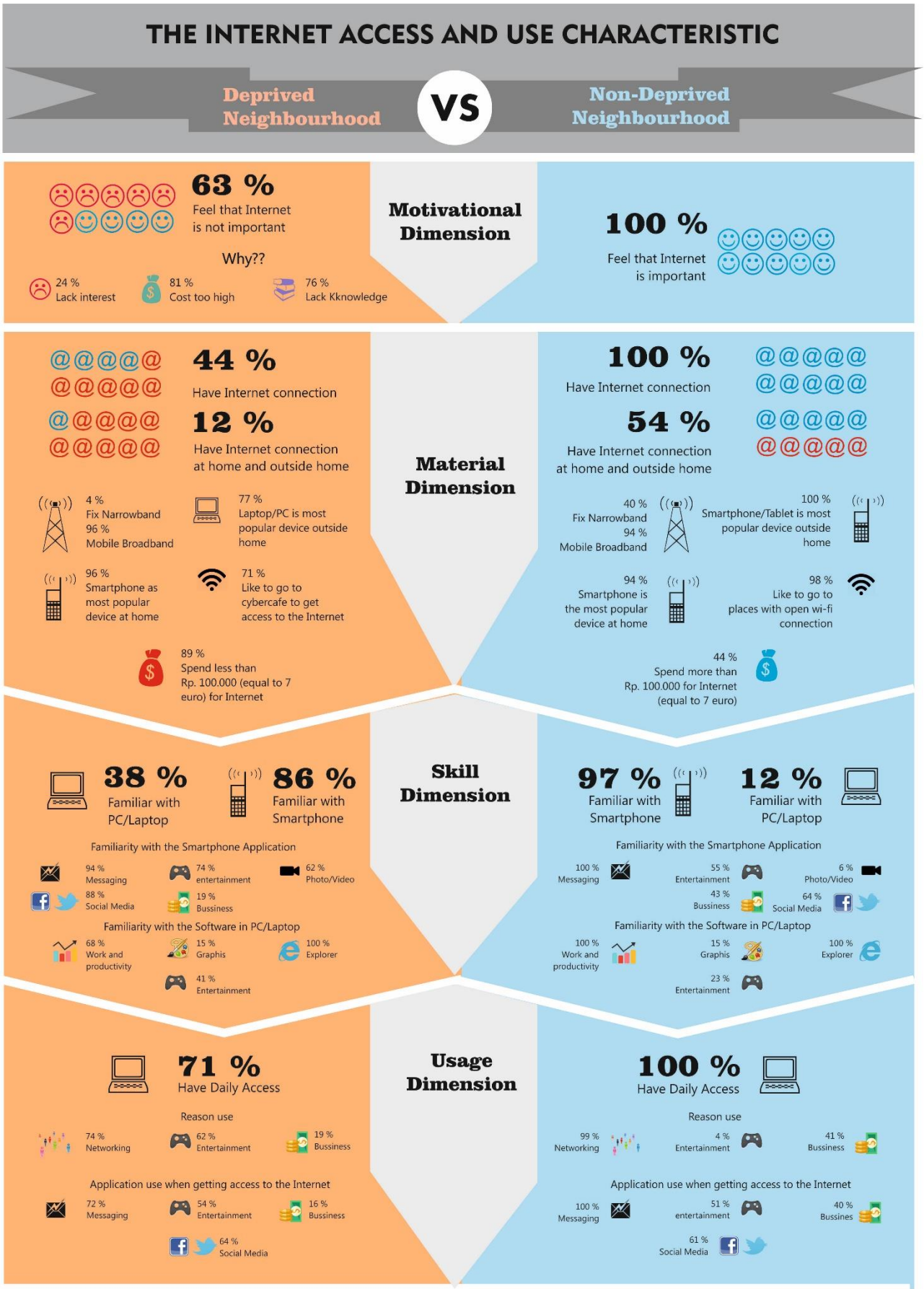


Figure 26 The Internet access and use characteristic in deprived and non-deprived neighbourhood

Table 17 The relationship of the digital divide dimensions and variables with deprivation

Dimension		Variables	Relationship with deprivation
Motivational	1	The importance of the Internet	Negative
	2	The Internet is not important (not interesting)	Positive
	3	The Internet is not important (cost to the service is too high)	Positive
	4	The Internet is not important (lack of knowledge)	Positive
Material Dimension	5	The Internet access at home	Negative
	6	The Internet access outside home	Negative
	7	Type of internet access at home (Fix narrowband)	Negative
	8	Type of internet access at home (Mobile broadband)	Negative
	9	Money spend for the internet	Negative
	10	Type device at home (Smartphone)	Negative
	11	Type device at home (PC/Laptop)	Negative
	12	Place to get Internet access outside home (cybercafé)	None[1]
	13	Place to get Internet access outside home (open free wi-fi)	Negative
	14	Place to get Internet access outside home (school/work)	None[1]
	15	Device use outside home (Smartphone/tablet)	Negative
	16	Device use outside home (PC/Laptop)	Positive
Skill Dimension	17	Device used/familiar (smartphone/tablet)	Negative
	18	Device used/familiar (PC/Laptop)	Positive
	19	Device used/familiar (none)	Positive
	20	Familiar smartphone application (messaging)	Negative
	21	Familiar smartphone application (social media)	Negative
	22	Familiar smartphone application (entertainment)	Negative
	23	Familiar smartphone application (business)	Negative
	24	Familiar smartphone application (photo/video)	Positive
	25	Familiar software in Laptop/PC (work and productivity)	None[1]
	26	Familiar software in Laptop/PC (graphic)	None[1]
	27	Familiar software in Laptop/PC (explorer)	None[1]
	28	Familiar software in Laptop/PC (entertainment)	None[1]
Usage dimension	29	Frequency in using the Internet	Negative
	30	Reason use (networking)	Negative
	31	Reason use (business)	Negative
	32	Reason use (entertainment)	Positive
	33	Application use if having Internet access (messaging)	Negative
	34	Application use if having Internet access (social media)	Negative
	35	Application use if having Internet access (business)	Negative

Note:
[1] the relationship is not valid because the expected value less than 5 or p > 0.05

5.3. THE INFLUENCE OF THE DEPRIVATION AND THE DIGITAL DIVIDE TO THE E-GOVERNMENT ACCESS FOR WATER SERVICE COMPLAINT IN SEMARANG

After knowing that the Internet access and use is more widespread in the non-deprived neighbourhood than in the deprived neighbourhood, the next step is analysing the influence of it to the e-government access especially for water service complaint in Semarang. Since Semarang has committed to be a smart city, several supporting facilities have been built in Semarang. One example of supporting facilities is complaint platform website which can also connect to social media such as Twitter. Beside Twitter and website, the complaint platform also allow citizen to make complaint through SMS (short message service). Since the Internet access and use characteristic is more better in non-deprived neighbourhoods, it will be interesting to know about the response of the deprived neighbourhood to face this challenge. From the literature, the Internet access and use limitation in deprived neighbourhoods might influence their interaction with e-government service especially with online complaint platform. The starting point of analysis is a discussion of the household's interaction with the e-government for water service complaint and it will end by a discussion of the influence of the deprivation and digital divide to the e-government service access for water service complaints and how it reinforces urban inequality.

5.3.1. THE HOUSEHOLD'S AND NEIGHBOURHOOD INTERACTION WITH E-GOVERNMENT SERVICE FOR WATER SERVICE COMPLAINTS

According to the PODES data, the selected study areas have water service provision from the water service company (PDAM), but after finishing the primary data collection, I realized that is true that the water service provision is available in the deprived neighbourhood (Bandarharjo) but only some of households use the service. The reason why people don't use the service from PDAM because they use water from deep well water (artesian well) with the price lower than from the water service company. More than that, there are policies from city government to give subsidy for artesian well drilling especially in neighbourhoods which have high proportion of poor people and they don't have access to PDAM. Since the residential area in non-deprived neighbourhood (Panggung Lor) is a real estate, so almost all people are using service from the water service company.

From 204 sample in deprived neighbourhood, only 17 respondents (8 %) respond that they are using water service provision from PDAM, while in non-deprived neighbourhood, 92 % respondents say that they are using water service from PDAM. Only 9 respondents in the deprived neighbourhood who respond that they face problems with water service, and the in non-deprived neighbourhood 71 % respondents are having problem with water service. The most occurrence problem in both areas is the continuity of water. Most of respondents' complaints is that water is not available every day, only available at a certain time or not available at all. Other problem is about the quality of water which, related to the smell, taste, and colour of the water.

Based on the interview with people from PDAM, it can be known that most of complaints came from the area with bad and middle water service quality. Mostly people do complaint by calling the customer service of water service company, few of them are using the twitter, SMS or LAPOR! website. By using the map of water service quality from PDAM and complaints distribution, it can be known that 63 % neighbourhoods are located in areas with middle and bad water service quality. For complaints distribution, 67 % of complaints came from areas with middle and bad water service quality. Figure 27 shows the map of complaints distribution toward water service quality.

Figure 28 is informing that most complaints which come from the areas with middle or bad water service quality are mostly grouped in 1st and 2nd quartile class while the complaints from good water service quality areas are mostly group in 3rd and 4th quartile class. It is not clear what makes people in 3rd and 4th quartile class with good water service quality are complaining about water service. Since most complaints are related to the continuity of water service, and other complaints are related to the disorganized payment system, problem in new instalment, and broken pipe. It could be the people with good service quality are complaining the rest of problem outside the continuity of water.

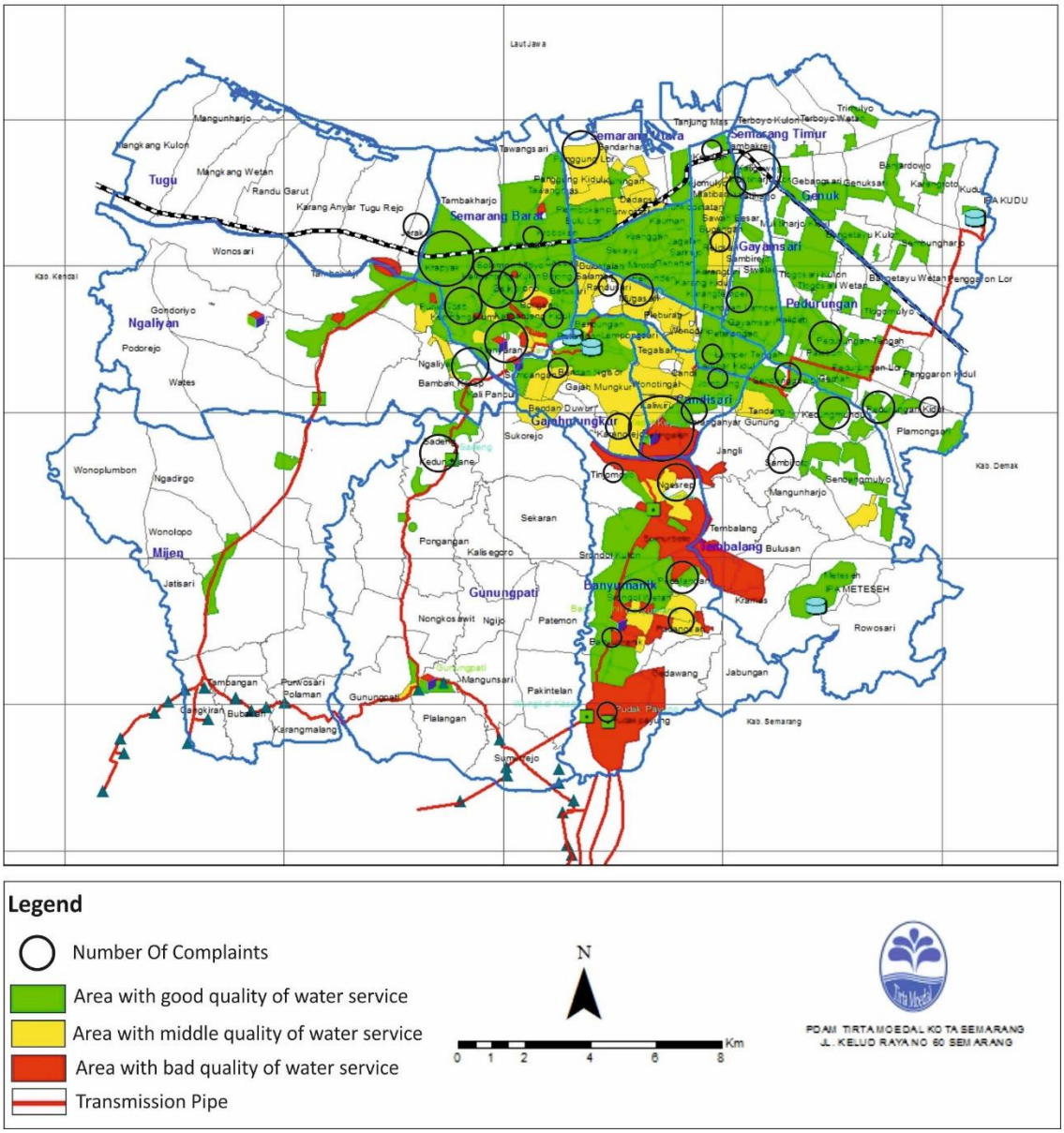


Figure 27 The map of water service quality toward complaint distribution

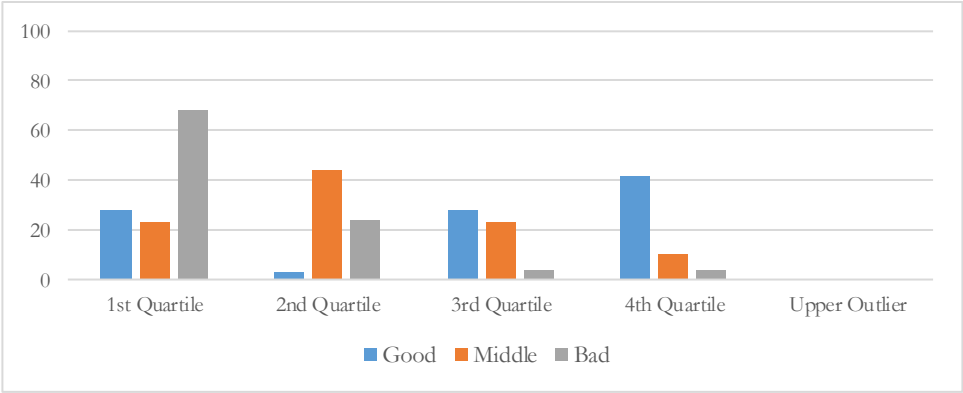


Figure 28 Proportion of complaints toward deprivation and water service quality

According LAPOR! system from May 2016 - January 2017, there are 109 complaints about water service which had been submitted by SMS, Twitter, and LAPOR! website and successfully recorded in LAPOR! system. Those complaints are distributed in 40 neighbourhoods which have water provision from water service company (PDAM). According to the deprivation class, 56 % of complaints came from neighbourhoods with 1st Quartile and 2nd Quartile class and 45 % of complaints came from the rest deprivation class. The detail of complaints distribution can be seen in figure 29 and table 18.

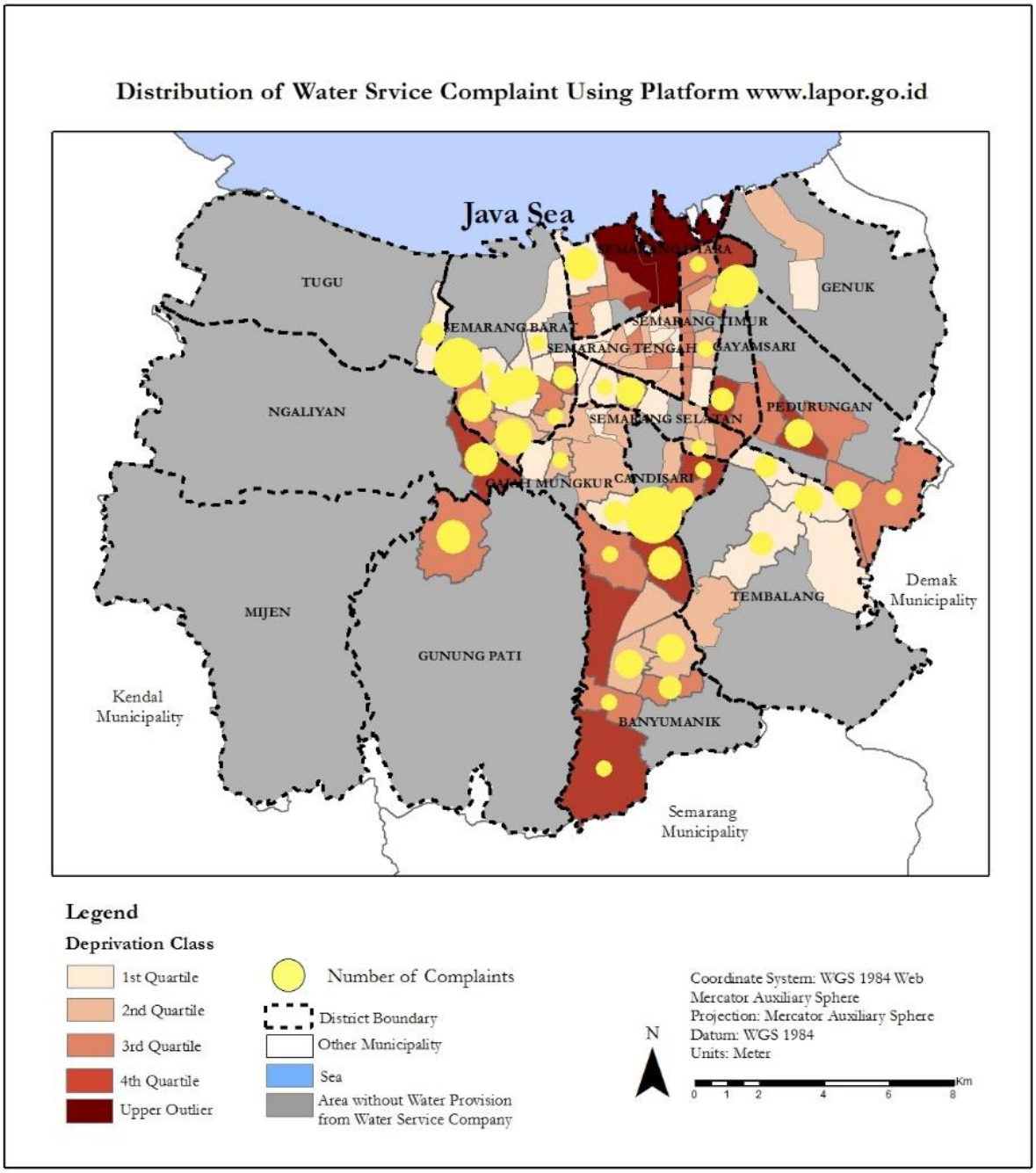


Figure 29 Distribution of water service complaint

Table 18 The proportion of complaints toward deprivation class

No	Deprivation Class	Number of Neighbourhood	%	Number of Complaints	%
1	1st Quartile	13	32.5	38	35
2	2nd Quartile	9	22.5	28	26
3	3rd Quartile	11	27.5	22	20
4	4th Quartile	7	17.5	21	19
5	Upper Outlier	0	0	0	0
Total				109	100

The association of the complaints distribution and deprivation can be verified by using correlation analysis on SPSS by using the complaint proportion and the deprivation index. The complaint proportion can be calculated by dividing the number of complaints with the total population in each neighbourhood. From the correlation result, it can be known that the relationship between deprivation and complaint proportion is not significant because $p > 0.05$. Table 19 shows the correlation result between the deprivation and complaints.

Table 19 The Correlation result between complaint proportion and Index of Multiple Deprivation

		IMD	Comp_Prop
IMD	Pearson Correlation	1	-.083
	Sig. (2-tailed)		.431
	N	93	93
Comp_Prop	Pearson Correlation	-.083	1
	Sig. (2-tailed)	.431	
	N	93	93

According to the questionnaire results, all respondents (9 respondents) in the deprived neighbourhood who have water service problem responded that they don't do anything if they get problems from water service company while about half of respondents in the non-deprived neighbourhood tried to call customer service of water service company or going to water service company office to complaint about their problem. Even though, according to the questionnaire the proportion of people who complaint and not complaint about water services problem in non-deprived neighbourhood is almost similar, but still the proportion of people who like to complaint is bigger than those who don't like to complaint. Even though the number who have answered about complaint in deprived neighbourhood are relatively small, but it seems people in deprived neighbourhood are less likely to complaint about water service problem than people in non-deprived neighbourhood. According to the complaints' distribution, there are four complaints about water service problem from non-deprived neighbourhood (Panggung Lor) confirmed that people in non-deprived neighbourhood are more active to give their voice for public service improvement. It might be happened because majority of household in non-deprived neighbourhood use water service from PDAM and located in the middle water service quality area.

By comparing the household income, type of neighbourhood, and complaints activities, we can see that there are no big differences in proportion between people with lower (below Rp. 3.000.000/month) and higher income (above Rp. 3.000.000) in complaint activities. From the field conversation with people in both neighbourhoods, it can be known that the people perception about complaints response is influenced their willingness to complaint. They think that complaints are wasting their time and energy since they think that the government never responds to their complaints and the problems are never solved.

Generally, in Indonesia people don't like to complaint because of many reasons. A report from BAPPENAS (2010b) about public services complaints management shows similar attitude of people in Indonesia toward complaints. People tend to be silence because they feel that complaints to the public services are useless and time consuming. Most think that of the complaints were not responded by the government and the problems never solved. Cendikia et. al. (2007) from PATTIRO in a report about complaint mechanism in Indonesia explained that the reason why people don't like to complaint about the public services is because of low awareness about their public services rights and no supporting channel for complaint.

5.3.2. THE INFLUENCE OF DEPRIVATION AND DIGITAL DIVIDE OVER THE ACCESS TO E-GOVERNMENT SERVICES FOR WATER COMPLAINT

After analysing the characteristic of Internet access and use in different neighbourhoods and the interaction of the neighbourhood with the water service complaints, this chapter discusses the influence of digital divide and deprivation over the inequality of access to e-government services for water complaint. I will start from the explanation of the response of people about online complaint platform from questionnaire followed by the discussion about the influence of the digital divide and deprivation over the access to e-government services for water complaint.

Figure 30 shows the response of people in both neighbourhood related to the e-government service for water service complaint. In total, there is 17 and 73 respondents in deprived and non-deprived neighbourhood who answered the question about the knowledge and reason not using water service complaint through Internet. All respondents in both neighbourhood have answered the question about opinion to the online complaint platform.

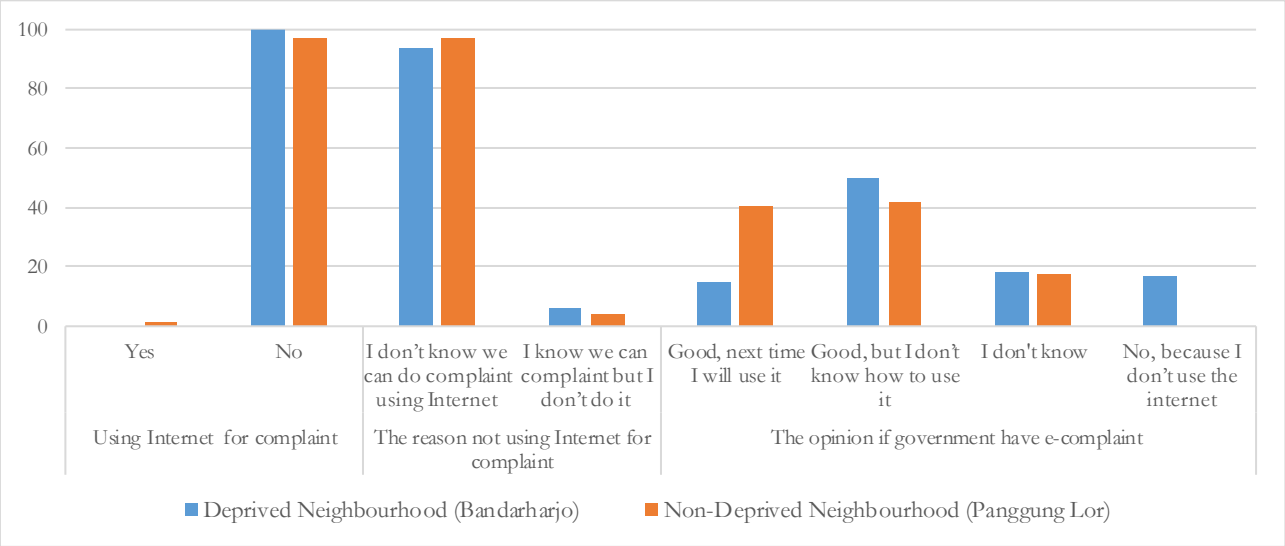


Figure 30 Response about e-government for complaint

In my early assumption, the non-deprived neighbourhood should engage more to e-government service for online complaint platform. However, based on the questionnaire result about the use of the Internet (social media and website) as complaint channel, only 1 out of 73 respondents who answered about knowledge to online complaint platform in non-deprived neighbourhood know about e-government service for online complaint platform and in deprived neighbourhood, none of people know about online complaint platform. The widespread Internet access and use in the non-deprived neighbourhood when compared to the deprived neighbourhood is resulted the expected assumption that people in the non-deprived neighbourhood will have better knowledge about the online complaint platform and will use it more than in the deprived neighbourhood. In reality, almost all of respondents who interviewed don't know about the online complaint platform. It might happen because people use the Internet

for other reasons like networking and business so they pay little attention to the online complaint platform. Another reason might be caused by the use another channel for complaining such as calling the customer service of PDAM or going to the water service company office directly. In the deprived neighbourhood, the number of people who don't know about the online complaint platform has a similar proportion among people who have Internet access and without Internet access at home. It seems that people in deprived neighbourhood is less likely to complaint because of lacking awareness to complaints and lacking access and knowledge to the Internet.

For the opinion in the use of the website and social media for the complaints in both neighbourhoods, the most frequent response in the deprived neighbourhood are for the option "good but I don't know how to use it" while in the non-deprived neighbourhood, the response for the option "good but I don't know how to use it" and "good, next time I will use it" share similar proportion. In the deprived neighbourhood, the response for the option "good, but I don't know how to use it" is influenced by the absence of the Internet connection, lack information about online complaint platform and lack of use of social media. In the non-deprived neighbourhood, it happens mostly because of lacking awareness about online complaint platform.

6. CONCLUSION AND RECOMMENDATION

The aim of this thesis was to analyse the relationships among digital divide, deprivation and access to e-government service in urban areas. To address this aim, this thesis pursued a case-study approach where two neighbourhoods in the city of Semarang were analysed with respect to levels of deprivation, digital divide and access to e-government services. This chapter will discuss the main conclusions derived from this study, the contribution to policy making and research, the limitations, and future research.

6.1. CONCLUSION

The main finding shows that there is a relationship between Internet access and use, and deprivation. The deprived neighbourhood is confirmed to have more limitations in accessing and using the Internet than non-deprived neighbourhood. The limitation can be identified as - the lack of motivation to use the Internet, the absence of the Internet access at home and outside home, the less capability to operate and use digital devices, and less connectivity in using the Internet. Conversely, the non-deprived neighbourhood has better access to and use of the Internet.

What could not be confirmed is that deprivation and digital divide will influence use of e-government services. This is due to several reasons. Firstly, the data collected about complaint is not enough to see the relationship between deprivation and access to e-government service which resulted in the insignificant correlation between deprivation and complaints' distribution. Since the e-government platform for water service complaint is still quite new in Semarang, it resulted in a small number of complaints which were registered in system. Furthermore, it seems that people in both neighbourhoods were not aware of this new system. This was mentioned in their responses about online complaint platform in questionnaires. Secondly, the proportion of complaints made from deprived and non-deprived neighbourhoods is almost similar. It could be because their complaints relate mainly to the water service quality areas. People who live in areas with bad or middle water service quality will complain more than those who live in areas with good water service quality.

Even though it is quite difficult to see the relationships among deprivation, digital divide, and access to e-government services for online complaint platform, it could be seen from the responses that people in the deprived neighbourhood are less likely to complain about water service problem than people in non-deprived neighbourhood. This could be due to several factors. A previous research from Cendikia et. al. (2007) about behaviour of people, especially poor people, towards complaint in Indonesia, mentioned that the lack of awareness to their public service rights, sceptical attitude towards complaint's response, and limited capacity to access the complaint channel are the factors that discourage people from complaining. Since people in the deprived neighbourhood are identified to have limited access to and use of the Internet, this could be the reason for their limited capacity in accessing complaint channel.

This research gives different perspectives from previous research about e-grievance redressal system in India from Martinez et al. (2011). They found that most complaints came from people in non-deprived neighbourhoods who requested the regulatory officials to manage the urban blight (encroachments, slums, hawkers, beggars). In Semarang, deprived and non-deprived neighbourhoods have similar problems to water service and they also have almost similar amount of complaints. In Semarang, people complained because they do not have any option for *exit mechanism* as there is only one provider, PDAM which provides water service in whole city. From field survey, it was found that the deprived neighbourhood (Bandarharjo) has better option for water service than non-deprived neighbourhood. Since people in the non-deprived neighbourhood do not have another option for water service, they are more likely to complain if the problems degrade their quality of life.

Even though this research failed to establish a relationship among digital divide, deprivation and access to e-government service, according to the finding of unequal access and participation to e-government information and services from previous research, the possibility of unequal access could be found in future. The online platform might be simply too recent and the knowledge of its existence is not widespread in Semarang, therefore not enough data exists to establish a potential cause and effect relationships among digital divide, deprivation and access to e-government services. Thomas & Streib (2003) and Gaventa (2000) explained that the different socio-economic and Internet access and use characteristics in both neighbourhoods might cause unequal access to e-government information and services. People who live in the deprived neighbourhood will get little or total loss of the information and service delivered online.

6.2. CONTRIBUTION TO POLICY MAKING

By understanding the relationship between digital divide and deprivation, this thesis can give a better picture to the policy maker in Semarang about the different characteristics of Internet access and use within the city and help in formulating policies to bridge the divide and prevent the possibility of unequal access to the government's online information and service. More than that, with the development of the smart city program in Semarang, this research can give supporting input for programs' formulation in the future. Further research is needed to know what type of programs can be implemented in future to address some of the problems found.

The government also needs to take care of the quality of public service and improve the citizen's trust by providing public services of good standard and improving the complaints mechanism. Since PDAM is the only provider of water service in the city, they need to improve their service quality in the city so it can minimize the complaints and improve trust and loyalty from the city inhabitants. If people are satisfied, the complaints can be minimized.

Another recommendation is to increase the awareness of the new e-government for complaint since it appears that people are not enough aware about it. It needs to publicised well in whole city and encourage people to use it. The more the people use it to share their experiences of public services, the more this feedback will be useful for government to establish priority, standards, or regulations for public service improvement

6.3. CONTRIBUTION TO RESEARCH

For the digital divide research, this research contributes to understanding different types of divide. The previous research in digital divide such from Chen (2013), Akhter (2003), Cooper (2006), Puspitasari & Ishii (2015), and van Deursen & van Dijk (2010) are still focused on the divide in individual socio-economic characteristics such as gender, age, job, education, income, race, and religion. Some research, such as from Stern et al. (2009), Sujarwoto & Tampubolon (2016), tried to include the spatial characteristics but it is still limited to the rural-urban areas, main – remote island, and Global South – Global North. None of them review the digital divide within city or urban areas. Since the current research confirms the spatial agglomeration of socio-economic characteristic within urban areas represented by deprived and non-deprived area, it is possible to see that the digital divide can also occur within different socio-economic agglomerations in urban areas. Hence, this research proves the assumption about the type of digital divide in urban areas.

For the research that focuses on the unequal access and opportunity between deprived and non-deprived groups, this research shows that different characteristics of the Internet access and use do not have any effect on their relationship to e-government for complaints. It seems that the non-deprived areas demand more for city improvement but in this case, it cannot be claimed that it happened because of different socio-economic characteristics or Internet and use access. The reason is the cultural attitude towards complaint and the quality of the service that become triggers behind it. However, considering the previous research about the citizen participation characteristic and type of government website visitors, it is possible that in future the people in deprived areas will be excluded from all online government activities. With the increase of Internet use in delivering the government information and services, in the future, we need to propose research related to it.

6.4. LIMITATION AND FUTURE RESEARCH

This research has limitations regarding the questionnaire, number of case studies, data availability and unexpected results. The recommendations for the future research are based on these limitations of the study since the topic needs more exploration in future.

The questionnaire used in this research has some limitations as it was difficult to differentiate the differences on skill and usage dimensions in deprived and non-deprived neighbourhoods. The questionnaire was formulated according to the literature on the digital divide and the questionnaire structure from previous studies. However, after the survey had been conducted, the limitations appeared as the result from the questionnaire was slightly different from expectation especially for the skill and usage dimension. The questions for both dimensions should be formulated separately in another research to get to know more about these issues.

This research also had a limited number of cases studies since it only focused on deprived and non-deprived neighbourhood that are extreme cases of deprivation. This research is focused on finding the differences in the Internet access and use in neighbourhoods with different socio-economic characteristics and their effect on the e-government service, especially for online complaints. Since the resources required to conduct survey in whole city are high, the research was conducted on two neighbourhoods due to limited resources to portray the extreme cases of the neighbourhoods. Hence, a most deprived and non-deprived neighbourhood were selected in this research to represent the case. However, the results of this research cannot be used to generalize the condition for whole city. For that, at least one neighbourhood in each neighbourhood class/type should be studied to get a better understanding of Internet access and use characteristics for whole city. It will also be difficult to make the generalization for all global south cities. For that, another case study area in another global south city must be studied to confirm the results. It would also be nice to choose a case study in another type of location such as in sub-urban area or in city centre with different neighbourhood types because this study is only focused are neighbourhoods which are in coastal zone area.

The research also had limited complaint data, limited number of the respondents who registered as PDAM customers in the deprived neighbourhood, and the map of water service distribution or water service quality. Since the e-government service just started in May 2016, it means only few people had submitted their complaints using this platform because they still use the conventional method by calling the customer service or going directly to the water company office. This makes the collected data about water service complaints relatively small and it is not enough to get clear relationship. More than that, it seems that there is a mismatch in between PODES data about water service distribution and real condition in the field. Since the PODES data uses binary variable to measure the availability of water service, it is difficult to measure the coverage of water service distribution in a neighbourhood. Before going to the field, it would have helped if there had been a confirmation with water the service company about the coverage of water service such as number of customers or area coverage in a neighbourhood. It is also difficult to adjust the real water service quality area in a neighbourhood because the GIS data and the published data in the water company website are not in accordance. Thus, it generalises/adjusts data about water service quality areas by using CorelDraw not using exact calculation such in ArcGIS.

Last limitation is related to the unexpected result from this research that deserves further study. The result from this study shows that it is difficult to see the relationship between the digital divide, deprivation, and access to e-government services in online complaint platform. Since the research was only for water service complaint, the data was not enough to draw the conclusion that the digital divide and deprivation affect the access to online complaint platform. In future studies, it is needed to include the complaints from another sector or only focus on the relation of people with e-government service for city information delivery or complaint platform.

For future research, this research suggests expanding the number of cases studies, the complaint field, and qualitative research to understand more about the effect of lack of access to the Internet on the access to the online complaint platform. To make the research suitable for generalization about whole city, it needs to take survey sample in each neighbourhood class type in different locations such as city centre or sub urban areas. It also needs

to take the cases from another city within the country or in global south countries it would be good to expand the complaint fields related to poverty-related problems such as health, education and infrastructure to know more about the distribution pattern of the complaints. Lastly, it needs to take deep interviews to better understand the relationship of lack of access to the Internet with the access to e-government service and how it affects their quality of life.

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8. ANNEXES

ANNEX 1: QUESTIONNAIRE FORM

Questionnaire

Hello, my name is…..… name interviewer) from ……. (origin). I am here on behalf of the University of Twente, Netherland. Do you have some time to participate and answer some questions for us? The interview should take about 15 minutes.

This questionnaire is aimed to get information about the access and use of The Internet of Semarang citizen and also the people knowledge and access to the e-government services especially for water service complaint in Semarang city. This questionnaire is developed to support the research about the role of digital divide and deprivation in access to e-government services for water service complaint in Semarang City, Central Java. We will keep your privacy and will use the information for research purpose only.

Interviewer : please fill in this information

Date :
Surveyor Name :
Neighborhood/RW :
Name

Instruction: please thick (√) the right/possible answer
Interviewer : the interview is meant for resident between 18 and 65 years old. If the respondent is older than 65 or younger than 18, explain the age selection criterion. Thank the respondent for their willingness to participate and ask if there are others in their household between 18 and 65 years old who might be able to participate.

	I. Respondent Information *Read: The first questions are about the household characteristic*
100	What is your gender?
	□ Male □ Female
101	Might I first ask you how old you are?
	□ _____ years old
102	How many people living in this household?
	□ _____ person
103	What is the occupation of the head of this household?
	□ Entrepreneur □ Fisherman/low paid property worker/low paid industrial worker/low paid farmer worker/street vendor □ Military/police/government officer □ Retired □ Service/other

104	What is the education level of the head of this household?
	☐ No formal education ☐ Elementary ☐ Junior high school ☐ Senior high school ☐ Undergraduate/ master/ doctoral
105	How much the average of household income every month?
	☐ < Rp. 1.000.000/ month ☐ Rp. 1.000.001 – Rp. 3.000.000/ month ☐ Rp. 3.000.001 – Rp. 6.000.000/ month ☐ > Rp. 6.000.001/ Month

II. The Internet Access and Use

Read : The following questions are about how you use and access Internet

201	Do you have access to The Internet in your home?		
	☐ Yes ☐ No, go to the question number **205**		
202	What type of The Internet services are used for Internet access at home?		
		Yes	No
	a. Fix narrowband network (First media, Speedy, etc) b. Mobile broadband network (Telkomsel, Indosat, etc)	☐ ☐	☐ ☐
203	How much money you spend for the Internet subscription every month in your home?		
	☐ < Rp. 50.000/month ☐ Rp. 50.000 – Rp. 100.000/month ☐ Rp. 100.001 – Rp. 300.000/month ☐ > Rp. 300.001/month		
204	What devices do you use to connect to The Internet in home?		
		Yes	No
	a. Smartphones b. PC/Laptop	☐ ☐	☐ ☐
205	Have you access the internet outside home?		
	☐ Yes ☐ No, go to question number **208**		
206	Where do u usually access the Internet outside home?		
		Yes	No
	a. Cybercafé/café b. Open free Wi-Fi connection area c. At school or work place	☐ ☐ ☐	☐ ☐ ☐

207	What devices do you use to connect to The Internet outside home?		
		Yes	No
	a. Smartphones	☐	☐
	b. PC/Laptop	☐	☐
208	What are device below you have and usually use?		
		Yes	No
	a. Smartphone/Tablet, go to the question number **209**	☐	☐
	b. PC/Laptop, go to the question number **210**	☐	☐
	c. None of above, go to the question number **211**	☐	☐
209	What application do you frequently use in your smartphone/tablet?		
		Yes	No
	a. Messaging application (whatsapp, bbm, line, skype, etc.)	☐	☐
	b. Social media application (facebook, path, twitter, Instagram, etc.)	☐	☐
	c. Entertainment application (games, youtube, streaming media, etc.)	☐	☐
	d. Business application (internet banking, online shop, etc.)	☐	☐
	e. Photo/video application	☐	☐
210	What software do you frequently use in your PC/laptop?		
		Yes	No
	a. Software to support work and productivity (Ms-office, email, etc.)	☐	☐
	b. Graphis software (photoshop, corel draw, video editing, etc)	☐	☐
	c. Internet explorer/firefox/ google chrome	☐	☐
	d. Entertainment (games, media player, video player)	☐	☐
211	Is it important for you to have access to the Internet either in home or outside home?		
	a. Yes b. No, go to the question number **215**		
212	How often did you access to the Internet?		
	☐ Every day ☐ Several times a week ☐ Once a week ☐ Once a month		
213	For what reason do you frequently use the Internet?		
		Yes	No
	a. Networking	☐	☐
	b. Business	☐	☐
	c. work/studies	☐	☐
	d. entertainment	☐	☐
214	When you have access to the internet, which application do you frequently use?		
		Yes	No
	a. Message application (whatsapp, facebook, line, bbm, e-mail etc.)	☐	☐
	b. Social media application (facebook, path, twitter, Instagram, etc.)	☐	☐
	c. Entertainment application (games, youtube, streaming media, etc.)	☐	☐
	d. Business application (internet banking, online shop, etc.)		

215	Why it is not important?		
		Yes	No
	a. The Internet is not interesting b. Cost to the service is too high c. Privacy or security consent d. Lack of confidence, knowledge or skills to use the Internet	☐ ☐ ☐ ☐	☐ ☐ ☐ ☐

III. Access to the e-government for water service complaint (PDAM) via twitter

Read: The last questions are about access to the e-government about water service complaint (PDAM) via twitter

301	Do you have water provision from PDAM (water company) in your home?		
	☐ Yes ☐ No		
302	Did you ever have a problem with the water service in your home?		
	☐ Yes ☐ No		
303	What kind of problem you usually have with the water service? (one or more answers are applicable)		
		Yes	No
	a. poor water quality (smelly, colour, chlorine taste) b. the continuity of water services is not fixed (the services is not available every day, water services only available in specific time) c. the quantity of water is not enough for daily need and it needs to get water from another source	☐ ☐ ☐	☐ ☐ ☐
304	What you do if you have a problem with the water service?		
	☐ Nothing to do, only wait until it normal again ☐ Trying to call customer service of water company ☐ Going to water company office directly to report the problem		
305	Did you ever try to use Internet media to report your complaint about water service?		
	☐ Yes ☐ No, go to question number **307**		
306	Why you never try to complain about water service through the Internet?		
	☐ I do not know we can do complain using Internet ☐ I know we can do complain but I do not do it		
307	What is your opinion if the city government have the e-complaint for public services through Internet?		
	☐ Good, next time I will use it ☐ Good, but I do not know how to use it ☐ I do not know ☐ No, because I do not use the Internet		

END INTERVIEW

We are now at the end of the questionnaire. Thanks again for your time. Do you have any question yourself about what we have discussed?

Interviewer, please report questions below.

ANNEX 2: DATA PROCESSING OF QUESTIONNAIRE

Part	Code	Label	Variable type	Values
Respondent Profile	Neighborhood	Deprivation	binary	1 = deprived neighborhood (Bandarharjo); 0 = non-deprived neighborhood
	n100	gender	binary	1 = male; 2 = female
	n101	age	interval	1 = "18 - 25"; 2 = "26-35"; 3 = "36-45"; 4 = "46-55"; 5= ">55"
	n102	household number	interval	1 = "1 - 2"; 2 = "3-4"; 3 = "5-6", 4 = ">7"
	n103	occupation	nominal	1 = entrepreneur; 2 = fisherman/low paid property worker/low paid industrial worker/street vendor; 3 = military/police/government officer; 4 = retirement; 5 = service/other
	n104	education level	ordinal	1 = no formal education; 2 = elementary; 3 = junior high school; 4 = senior high school; 5 = undergraduate/master/doctoral
	n105	household income	interval	1 = < Rp. 1.000.000/month; 2 = Rp. 1.000.001 - Rp. 3.000.000/month; 3 = Rp. 3.000.001 - Rp. 6.000.000/month; 4 = > Rp. 6.000.001/month
The Internet Access and Use	n201	The Internet access	binary	0 = no; 1 = yes
	n202a	Type of Internet Access (fix narrowband)	binary	0 = no; 1 = yes
	n202b	Type of Internet Access (mobile broadband)	binary	0 = no; 1 = yes
	n203	Money spend for the Internet (Rp)	interval	1 = < Rp. 50.000/month; 2 = Rp. 50.000 - Rp. 100.000/month; 3 = Rp. 100.001 - Rp. 300.000/month; 4 = > Rp. 300.001/month
	n204a	Type of device home (smartphone)	binary	0 = no; 1 = yes
	n204b	Type of device home (PC/Laptop)	binary	0 = no; 1 = yes
	n205	Access internet outside home	binary	0 = no; 1 = yes
	n206a	Access internet outside home (cybercafe)	binary	0 = no; 1 = yes
	n206b	Access internet outside home (open free wi-fi)	binary	0 = no; 1 = yes
	n206c	Access internet outside home (school/work)	binary	0 = no; 1 = yes
	n207a	Type of device outside home (smartphone/tablet)	binary	0 = no; 1 = yes
	n207b	Type of device outside home (PC/Laptop)	binary	0 = no; 1 = yes
	n208a	Device use (smartphone/tablet)	binary	0 = no; 1 = yes
	n208b	Device use (PC/Laptop)	binary	0 = no; 1 = yes
	n208c	Device use (none)	binary	0 = no; 1 = yes
	n209a	Smartphone Application (messaging)	binary	0 = no; 1 = yes

Part	Code	Label	Variable type	Values
	n209b	Smartphone Application (Social Media)	binary	0 = no; 1 = yes
	n209c	Smartphone Application (Entertainment)	binary	0 = no; 1 = yes
	n209d	Smartphone Application (Bussiness)	binary	0 = no; 1 = yes
	n209e	Smartphone Application (photo/video)	binary	0 = no; 1 = yes
	n210a	Software use (work and productivity)	binary	0 = no; 1 = yes
	n210b	Software use (graphis)	binary	0 = no; 1 = yes
	n210c	Software use (internet explorer)	binary	0 = no; 1 = yes
	n210d	Software use (entertainment)	binary	0 = no; 1 = yes
	n211	The importance of the Internet	binary	0 = no; 1 = yes
	n212	Frequency of The Internet access	ordinal	4 = every day; 3 = several times a week; 2 = once a week; 1 = once a month
	n213a	Reason use (networking)	binary	0 = no; 1 = yes
	n213b	Reason use (business)	binary	0 = no; 1 = yes
	n213c	Reason use (work/studies)	binary	0 = no; 1 = yes
	n213d	Reason use (entertainment)	binary	0 = no; 1 = yes
	n214a	Application for the Internet (message)	binary	0 = no; 1 = yes
	n214b	Application for the Internet (social media)	binary	0 = no; 1 = yes
	n214c	Application for the Internet (entertainment)	binary	0 = no; 1 = yes
	n214d	Application for the Internet (business)	binary	0 = no; 1 = yes
	n215a	The Internet is not important (not interesting)	binary	0 = no; 1 = yes
	n215b	The Internet is not important (cost to the service is too high)	binary	0 = no; 1 = yes
	n215c	The Internet is not important (privacy consent)	binary	0 = no; 1 = yes
	n215d	The Internet is not important (lack of knowledge)	binary	0 = no; 1 = yes
Access to e-government for water service complaint (PDAM)	n301	Water provision	binary	0 = no; 1 = yes
	n302	Water service problem	binary	0 = no; 1 = yes
	n303a	Problem (poor water quality)	binary	0 = no; 1 = yes
	n303b	Problem (the continuity is not fix)	binary	0 = no; 1 = yes
	n303c	Problem (the quantity is not enough)	binary	0 = no; 1 = yes

Part	Code	Label	Variable type	Values
	n304	Water Problem solving	ordinal	1 = nothing to do, only wait until it normal again; 2 = trying to call customer service of water company; 3 = going to water company office directly to report the problem
	n305	The use of website or social media for complaint	binary	0 = no; 1 = yes
	n306	The water company respond for the complaint	ordinal	1 = 1 day; 2 = more than a day; 3 = more than a week; 4 = more than 1 month; 5 = the problem never solve
	n307	The reason doesn't complain using Internet	ordinal	1 = i don't know if we can do complaint through Internet; 2 = I know we can do complaint but I don't do it
	n308	The opinion if government have e-complaint for public services using Internet	ordinal	1 = good, next time I will use it; 2 = good, but I don't know how to use it; 3 = I don't know; 4 = no, because I don't use the Internet

ANNEX 3: CROSSTAB DATA RESULT FROM QUESTIONNAIRE

Variables	Categories	Deprived Neighbourhood (Bandarharjo)	Non-Deprived Neighbourhood (Panggung Lor)
RESPONDENT PROFILE			
Gender	male	89	77
	female	115	37
Age	18-25	31	25
	26-35	55	25
	36-45	60	33
	46-55	31	17
	> 55	27	14
Household Size	1 - 2 person	24	9
	3 - 4 person	90	71
	5 - 6 person	61	30
	> 7 person	29	4
Occupation	entrepreneur	47	33
	low paid worker	57	4
	military/government officer/police	3	2
	retirement	2	5
	service/other	95	70
Education Level	no formal education	7	0
	elementary school	77	3
	junior high school	45	6
	senior high school	68	64
	undergraduate/master/doctoral	6	41
Household Income	< Rp. 1.000.000/month	39	0
	Rp. 1.000.001 - Rp. 3.000.000/month	144	42
	Rp. 3.000.001 - Rp. 6.000.001/month	21	51
	Rp. 6.000.001/month	0	21
DIGITAL DIVIDE DIMENSION			
Motivational Dimensions			
The Importance of the Internet	yes	75	113
	no	129	1
Internet is not important	internet is not interesting	31	0
	cost of the service is too high	104	1
	privacy consent	0	0
	lack of knowledge	98	0
Material Dimensions			
The internet access at home	yes	80	113
	no	124	1

Type of internet access	fix narrowband	3	45
	mobile broadband	77	106
Type device at home	Smartphone	77	106
	Laptop/PC	16	18
Internet access outside home	yes	35	61
	no	169	53
Internet access outside home (place)	cybercafe	25	9
	open free wi-fi	14	60
	school/work	6	7
Device used outside home	smartphone/tablet	23	61
	PC/Laptop	27	0
Money spend for the internet	< Rp. 50.000	32	16
	Rp. 50.000 - Rp. 100.000	38	47
	Rp.100.001 - Rp. 300.000	8	36
	> Rp. 300.001	1	14
Skill dimension			
Device ownership	smartphone/tablet	77	110
	PC/Laptop	34	6
	none	111	0
Familiar smartphone application	messaging	72	112
	social media	68	70
	entertainment	57	61
	bussiness	15	47
	photo/video	48	7
Familiar software in laptop/PC	work and productivity	23	13
	graphis	5	2
	explorer	37	13
	entertainment	14	3
Usage Dimension			
Frequency in using the Internet	everyday	54	113
	several times a week	17	0
	once a week	2	0
	once a month	3	0
Reason use	networking	67	112
	business	17	46
	work/studies	28	3
	entertainment	56	4
The application used if have the Internet access	messaging	65	113
	social media	58	69
	entertainment	49	58
	bussiness	14	45

ACCESS TO E-GOVERNMENT			
PDAM provision	yes	17	105
	no	187	9
Water problem	yes	8	74
	no	8	30
Problem	poor quality	5	25
	continuity is not fix	6	70
	quantity is not enough	0	0
Water problem solving	nothing to do	9	33
	call customer service	0	40
	going to water company to complaint	1	2
Using Internet for complaint	yes	0	1
	no	12	73
The reason why never do complain through the Internet	I do not know we can do complain using Internet	10	71
	I know we can do complaint but I do not do it	1	2
The opinion if government have e-complaint through website or social media	good, next time I will use it	30	46
	good, but I don't know how to use it	102	48
	I do not know	38	15
	No, because I do not use the Internet	31	0

ANNEX 4: IMD CALCULATION AFTER VARIABLES NORMALIZATION

No	District	Neighbourhood	per_ farm	per_ fw	per_ fish	per_ ind	slum_ area_ per	poor_ per_	IMD	Dep_Class
1	Banyumanik	Pedalangan	0.03	0.00	0.00	0.01	0.00	0.08	0.01	1st quartile
2	Banyumanik	Sumurboto	0.00	0.00	0.00	0.04	0.00	0.04	0.01	1st quartile
3	Banyumanik	Padangsari	0.00	0.00	0.00	0.05	0.01	0.06	0.01	1st quartile
4	Banyumanik	Banyumanik	0.01	0.00	0.00	0.07	0.00	0.14	0.01	1st quartile
5	Banyumanik	Ngesrep	0.00	0.00	0.00	0.08	0.02	0.12	0.02	1st quartile
6	Banyumanik	Srondol wetan	0.05	0.00	0.00	0.07	0.00	0.13	0.02	1st quartile
7	Banyumanik	Tinjomoyo	0.04	0.00	0.00	0.02	0.15	0.09	0.03	2nd Quartile
8	Banyumanik	Gedawang	0.40	0.00	0.00	0.01	0.15	0.08	0.09	3rd Quartile
9	Banyumanik	Jabungan	0.44	0.00	0.00	0.01	0.31	0.10	0.13	4th Quartile
10	Banyumanik	Pudakpayung	0.76	0.00	0.00	0.07	0.00	0.10	0.14	4th Quartile
11	Banyumanik	Srondol kulon	0.93	0.00	0.00	0.08	0.10	0.13	0.19	4th Quartile
12	Candisari	Kaliwiru	0.00	0.00	0.00	0.03	0.00	0.07	0.00	1st quartile
13	Candisari	Jomblang	0.00	0.00	0.00	0.08	0.03	0.53	0.02	1st quartile
14	Candisari	Candi	0.00	0.00	0.00	0.18	0.00	0.37	0.03	2nd Quartile
15	Candisari	Jatingaleh	0.00	0.00	0.00	0.19	0.00	0.12	0.03	2nd Quartile
16	Candisari	Karanganyar gunung	0.00	0.00	0.00	0.14	0.04	0.31	0.03	2nd Quartile
17	Candisari	Wonotingal	0.00	0.00	0.00	0.26	0.00	0.14	0.04	2nd Quartile
18	Candisari	Tegalsari	0.00	0.00	0.00	0.31	0.00	0.21	0.05	2nd Quartile
19	Gajah Mungkur	Sampangan	0.00	0.00	0.00	0.01	0.00	0.15	0.00	1st quartile
20	Gajah Mungkur	Karang rejo	0.00	0.00	0.00	0.02	0.00	0.15	0.00	1st quartile
21	Gajah Mungkur	Bendungan	0.00	0.00	0.00	0.04	0.00	0.11	0.01	1st quartile
22	Gajah Mungkur	Bendan duwur	0.00	0.04	0.00	0.04	0.00	0.09	0.01	1st quartile
23	Gajah Mungkur	Bendan ngisor	0.00	0.00	0.00	0.13	0.00	0.08	0.02	1st quartile
24	Gajah Mungkur	Lempongsari	0.00	0.00	0.00	0.13	0.00	0.12	0.02	1st quartile
25	Gajah Mungkur	Petompon	0.00	0.00	0.00	0.16	0.00	0.13	0.03	2nd Quartile
26	Gajah Mungkur	Gajahmungkur	0.00	0.00	0.00	0.16	0.00	0.33	0.03	2nd Quartile
27	Gayamsari	Siwalan	0.00	0.00	0.00	0.34	0.00	0.12	0.06	3rd Quartile
28	Gayamsari	Sambirejo	0.11	0.00	0.00	0.25	0.00	0.16	0.06	3rd Quartile
29	Gayamsari	Gayamsari	0.00	0.00	0.00	0.38	0.04	0.11	0.07	3rd Quartile
30	Gayamsari	Sawahbesar	0.00	0.00	0.00	0.28	0.16	0.33	0.07	3rd Quartile
31	Gayamsari	Kaligawe	0.00	0.00	0.00	0.41	0.20	0.25	0.10	4th Quartile
32	Gayamsari	Pandean lamper	0.00	0.00	0.00	0.68	0.00	0.21	0.11	4th Quartile
33	Gayamsari	Tambakrejo	0.00	0.00	0.04	0.65	0.14	0.34	0.14	4th Quartile
34	Genuk	Gebangsari	0.00	0.00	0.01	0.05	0.00	0.03	0.01	1st quartile
35	Genuk	Terboyo kulon	0.00	0.03	0.00	0.02	0.02	0.01	0.01	1st quartile
36	Genuk	Muktiharjo lor	0.00	0.00	0.00	0.19	0.00	0.07	0.03	2nd Quartile
37	Genuk	Terboyo wetan	0.08	0.09	0.00	0.01	0.00	0.06	0.03	2nd Quartile
38	Genuk	Trimulyo	0.00	0.00	0.01	0.20	0.16	0.09	0.06	3rd Quartile
39	Genuk	Bangetayu kulon	0.18	0.16	0.00	0.11	0.00	0.39	0.07	3rd Quartile

40	Genuk	Penggaron lor	0.13	0.25	0.00	0.17	0.00	0.07	0.09	3rd Quartile
41	Genuk	Banjardowo	0.08	0.09	0.00	0.43	0.09	0.19	0.12	4th Quartile
42	Genuk	Genuksari	0.07	0.06	0.00	0.46	0.16	0.24	0.13	4th Quartile
43	Genuk	Sembungharjo	0.66	0.31	0.00	0.06	0.00	0.17	0.17	4th Quartile
44	Genuk	Karangroto	0.37	0.18	0.00	0.54	0.00	0.21	0.18	4th Quartile
45	Genuk	Kudu	0.58	0.67	0.00	0.11	0.00	0.14	0.23	upper outlier
46	Genuk	Bangetayu wetan	1.00	0.76	0.00	0.01	0.00	0.18	0.30	upper outlier
47	Gunung Pati	Kalisegoro	0.07	0.00	0.00	0.05	0.00	0.04	0.02	1st quartile
48	Gunung Pati	Jatirejo	0.17	0.00	0.00	0.01	0.00	0.06	0.03	2nd Quartile
49	Gunung Pati	Cepoko	0.15	0.00	0.00	0.04	0.00	0.10	0.03	2nd Quartile
50	Gunung Pati	Sekaran	0.09	0.00	0.00	0.05	0.08	0.07	0.04	2nd Quartile
51	Gunung Pati	Sukorejo	0.13	0.00	0.00	0.05	0.07	0.24	0.04	2nd Quartile
52	Gunung Pati	Kandri	0.21	0.00	0.00	0.05	0.00	0.07	0.04	2nd Quartile
53	Gunung Pati	Pakintelan	0.01	0.00	0.00	0.27	0.00	0.07	0.05	2nd Quartile
54	Gunung Pati	Patemon	0.22	0.00	0.00	0.08	0.00	0.06	0.05	2nd Quartile
55	Gunung Pati	Ngijo	0.25	0.00	0.00	0.06	0.00	0.04	0.05	2nd Quartile
56	Gunung Pati	Plalangan	0.27	0.00	0.00	0.05	0.00	0.03	0.05	2nd Quartile
57	Gunung Pati	Sumurejo	0.20	0.00	0.00	0.13	0.00	0.06	0.06	3rd Quartile
58	Gunung Pati	Mangunsari	0.29	0.00	0.00	0.10	0.00	0.07	0.06	3rd Quartile
59	Gunung Pati	Pungangan	0.24	0.00	0.00	0.16	0.00	0.13	0.07	3rd Quartile
60	Gunung Pati	Sadeng	0.12	0.00	0.00	0.25	0.07	0.05	0.07	3rd Quartile
61	Gunung Pati	Nongkosawit	0.29	0.00	0.00	0.16	0.10	0.09	0.09	3rd Quartile
62	Gunung Pati	Gunungpati	0.71	0.00	0.01	0.00	0.00	0.15	0.12	4th Quartile
63	Mijen	Pesantren	0.03	0.08	0.00	0.06	0.00	0.00	0.03	2nd Quartile
64	Mijen	Jatisari	0.11	0.03	0.00	0.09	0.00	0.00	0.04	2nd Quartile
65	Mijen	Polaman	0.11	0.23	0.00	0.03	0.00	0.00	0.06	3rd Quartile
66	Mijen	Jatibarang	0.10	0.32	0.00	0.05	0.02	0.00	0.08	3rd Quartile
67	Mijen	Cangkiran	0.04	0.36	0.00	0.11	0.00	0.00	0.09	3rd Quartile
68	Mijen	Bubakan	0.08	0.45	0.00	0.00	0.00	0.00	0.09	3rd Quartile
69	Mijen	Mijen	0.08	0.13	0.00	0.35	0.00	0.00	0.09	3rd Quartile
70	Mijen	Karangmalang	0.10	0.47	0.00	0.02	0.00	0.00	0.10	4th Quartile
71	Mijen	Ngadirgo	0.06	0.39	0.00	0.17	0.00	0.00	0.10	4th Quartile
72	Mijen	Tambangan	0.17	0.35	0.00	0.11	0.00	0.00	0.11	4th Quartile
73	Mijen	Kedungpani	0.19	0.38	0.00	0.17	0.00	0.00	0.12	4th Quartile
74	Mijen	Wonoplumbon	0.30	0.69	0.00	0.07	0.00	0.00	0.18	4th Quartile
75	Mijen	Wonolopo	0.41	1.00	0.00	0.06	0.00	0.00	0.24	upper outlier
76	Ngaliyan	Purwoyoso	0.02	0.07	0.00	0.32	0.04	0.00	0.08	3rd Quartile
77	Ngaliyan	Bambankerep	0.38	0.06	0.00	0.15	0.00	0.00	0.10	4th Quartile
78	Ngaliyan	Bringin	0.08	0.29	0.00	0.34	0.00	0.00	0.12	4th Quartile
79	Ngaliyan	Gondoriyo	0.36	0.16	0.00	0.20	0.00	0.00	0.12	4th Quartile
80	Ngaliyan	Wates	0.06	0.61	0.00	0.08	0.00	0.00	0.13	4th Quartile
81	Ngaliyan	Wonosari	0.01	0.16	0.00	0.56	0.08	0.00	0.14	4th Quartile
82	Ngaliyan	Podorejo	0.74	0.16	0.00	0.06	0.00	0.00	0.16	4th Quartile
83	Ngaliyan	Ngaliyan	0.16	0.54	0.00	0.39	0.00	0.00	0.18	4th Quartile

84	Ngaliyan	Kalipancur	0.24	0.71	0.00	0.17	0.04	0.00	0.19	4th Quartile
85	Ngaliyan	Tambakaji	0.04	0.38	0.00	0.82	0.00	0.00	0.20	4th Quartile
86	Pedurungan	Penggaron kidul	0.01	0.04	0.00	0.12	0.06	0.06	0.04	2nd Quartile
87	Pedurungan	Tlogosari wetan	0.02	0.05	0.00	0.18	0.00	0.12	0.04	2nd Quartile
88	Pedurungan	Pedurungan lor	0.02	0.06	0.00	0.18	0.00	0.07	0.04	2nd Quartile
89	Pedurungan	Kalicari	0.02	0.05	0.00	0.24	0.00	0.06	0.05	2nd Quartile
90	Pedurungan	Plamongan sari	0.03	0.10	0.00	0.23	0.00	0.13	0.06	3rd Quartile
91	Pedurungan	Tlogomulyo	0.03	0.11	0.00	0.23	0.00	0.13	0.06	3rd Quartile
92	Pedurungan	Pedurungan kidul	0.03	0.07	0.00	0.29	0.00	0.11	0.07	3rd Quartile
93	Pedurungan	Pedurungan tengah	0.03	0.09	0.00	0.29	0.00	0.10	0.07	3rd Quartile
94	Pedurungan	Palebon	0.02	0.07	0.00	0.36	0.00	0.13	0.07	3rd Quartile
95	Pedurungan	Gemah	0.03	0.09	0.00	0.39	0.15	0.30	0.11	4th Quartile
96	Pedurungan	Tlogosari kulon	0.06	0.18	0.00	1.00	0.00	0.15	0.21	upper outlier
97	Pedurungan	Muktiharjo kidul	0.08	0.26	0.00	0.79	0.37	0.37	0.25	upper outlier
98	Semarang Barat	Tawangsari	0.00	0.00	0.00	0.01	0.00	0.00	0.00	1st quartile
99	Semarang Barat	Cabean	0.00	0.00	0.00	0.02	0.00	0.05	0.00	1st quartile
100	Semarang Barat	Kalibanteng kulon	0.00	0.00	0.00	0.03	0.00	0.10	0.01	1st quartile
101	Semarang Barat	Krapyak	0.00	0.00	0.00	0.05	0.00	0.08	0.01	1st quartile
102	Semarang Barat	Kalibanteng kidul	0.00	0.00	0.00	0.06	0.00	0.08	0.01	1st quartile
103	Semarang Barat	Salamanmloyo	0.00	0.00	0.00	0.07	0.00	0.06	0.01	1st quartile
104	Semarang Barat	Tawangmas	0.00	0.05	0.01	0.03	0.00	0.00	0.02	1st quartile
105	Semarang Barat	Gisikdrono	0.02	0.01	0.00	0.08	0.00	0.28	0.02	1st quartile
106	Semarang Barat	Karang ayu	0.00	0.00	0.00	0.11	0.00	0.17	0.02	1st quartile
107	Semarang Barat	Tambak harjo	0.02	0.02	0.00	0.06	0.07	0.06	0.03	2nd Quartile
108	Semarang Barat	Manyaran	0.00	0.00	0.00	0.30	0.00	0.34	0.05	2nd Quartile
109	Semarang Barat	Ngemplaksimongan	0.00	0.00	0.00	0.28	0.04	0.30	0.05	2nd Quartile
110	Semarang Barat	Bojongsalaman	0.00	0.00	0.00	0.37	0.00	0.18	0.06	3rd Quartile
111	Semarang Barat	Kembangarum	0.00	0.00	0.00	0.41	0.00	0.00	0.07	3rd Quartile
112	Semarang Barat	Bongsari	0.00	0.00	0.00	0.45	0.00	0.26	0.08	3rd Quartile
113	Semarang Barat	Krobokan	0.00	0.00	0.02	0.04	0.43	0.24	0.08	3rd Quartile
114	Semarang Selatan	Barusari	0.00	0.00	0.00	0.00	0.00	0.12	0.00	1st quartile
115	Semarang Selatan	Wonodri	0.00	0.00	0.00	0.03	0.00	0.21	0.01	1st quartile
116	Semarang Selatan	Randusari	0.00	0.00	0.00	0.05	0.00	0.23	0.01	1st quartile
117	Semarang Selatan	Pleburan	0.00	0.00	0.00	0.05	0.00	0.06	0.01	1st quartile
118	Semarang Selatan	Bulustalan	0.00	0.00	0.00	0.14	0.00	0.10	0.02	1st quartile
119	Semarang Selatan	Peterongan	0.00	0.00	0.00	0.20	0.04	0.19	0.04	2nd Quartile
120	Semarang Selatan	Lamper kidul	0.00	0.00	0.00	0.24	0.04	0.07	0.05	2nd Quartile
121	Semarang Selatan	Mugassari	0.00	0.00	0.00	0.32	0.00	0.18	0.05	2nd Quartile
122	Semarang Selatan	Lamper lor	0.00	0.00	0.00	0.23	0.13	0.16	0.06	3rd Quartile
123	Semarang Selatan	Lamper tengah	0.00	0.00	0.00	0.21	0.20	0.29	0.07	3rd Quartile
124	Semarang Tengah	Pandansari	0.00	0.00	0.00	0.00	0.00	0.07	0.00	1st quartile
125	Semarang Tengah	Pendrikan kidul	0.00	0.00	0.00	0.01	0.00	0.03	0.00	1st quartile
126	Semarang Tengah	Kranggan	0.00	0.00	0.00	0.02	0.00	0.07	0.00	1st quartile
127	Semarang Tengah	Karangkidul	0.00	0.00	0.00	0.03	0.00	0.09	0.00	1st quartile

128	Semarang Tengah	Kauman	0.00	0.00	0.00	0.02	0.05	0.05	0.01	1st quartile
129	Semarang Tengah	Pendrikan lor	0.00	0.00	0.00	0.08	0.00	0.09	0.01	1st quartile
130	Semarang Tengah	Jagalan	0.00	0.00	0.00	0.11	0.04	0.12	0.02	1st quartile
131	Semarang Tengah	Sekayu	0.00	0.00	0.00	0.11	0.06	0.08	0.03	2nd Quartile
132	Semarang Tengah	Pekunden	0.00	0.00	0.00	0.05	0.13	0.06	0.03	2nd Quartile
133	Semarang Tengah	Bangunharjo	0.00	0.00	0.00	0.09	0.11	0.04	0.03	2nd Quartile
134	Semarang Tengah	Gabahan	0.00	0.00	0.00	0.19	0.00	0.21	0.03	2nd Quartile
135	Semarang Tengah	Miroto	0.00	0.00	0.00	0.02	0.19	0.10	0.03	2nd Quartile
136	Semarang Tengah	Purwodinatan	0.00	0.00	0.00	0.22	0.00	0.18	0.04	2nd Quartile
137	Semarang Tengah	Brumbungan	0.00	0.00	0.00	0.15	0.07	0.10	0.04	2nd Quartile
138	Semarang Tengah	Kembangsari	0.00	0.00	0.00	0.18	0.13	0.09	0.05	2nd Quartile
139	Semarang Timur	Karangtempel	0.00	0.00	0.00	0.12	0.00	0.02	0.02	1st quartile
140	Semarang Timur	Rejosari	0.00	0.00	0.00	0.11	0.03	0.27	0.02	1st quartile
141	Semarang Timur	Mlatibaru	0.00	0.00	0.00	0.10	0.10	0.13	0.03	2nd Quartile
142	Semarang Timur	Bugangan	0.00	0.00	0.00	0.10	0.22	0.14	0.05	2nd Quartile
143	Semarang Timur	Karangturi	0.00	0.00	0.00	0.35	0.00	0.05	0.06	3rd Quartile
144	Semarang Timur	Kebonagung	0.00	0.00	0.00	0.36	0.00	0.11	0.06	3rd Quartile
145	Semarang Timur	Sarirejo	0.00	0.00	0.00	0.41	0.00	0.22	0.07	3rd Quartile
146	Semarang Timur	Mlatiharjo	0.00	0.00	0.00	0.15	0.31	0.10	0.08	3rd Quartile
147	Semarang Timur	Rejomulyo	0.00	0.00	0.00	0.34	0.22	0.09	0.09	3rd Quartile
148	Semarang Timur	Kemijen	0.00	0.00	0.00	0.15	0.42	0.32	0.10	4th Quartile
149	Semarang Utara	Plombokan	0.00	0.00	0.00	0.04	0.00	0.24	0.01	1st quartile
150	Semarang Utara	Panggung lor	0.00	0.00	0.00	0.14	0.00	0.01	0.02	1st quartile
151	Semarang Utara	Bulu lor	0.00	0.00	0.00	0.35	0.00	0.31	0.06	3rd Quartile
152	Semarang Utara	Kuningan	0.00	0.00	0.02	0.00	0.61	0.30	0.11	4th Quartile
153	Semarang Utara	Panggung kidul	0.00	0.00	0.00	0.01	0.69	0.17	0.12	4th Quartile
154	Semarang Utara	Dadapsari	0.00	0.00	0.00	0.19	0.72	0.30	0.15	4th Quartile
155	Semarang Utara	Purwosari	0.24	0.75	0.00	0.03	0.09	0.19	0.19	4th Quartile
156	Semarang Utara	Purwosari	0.24	0.75	0.00	0.03	0.09	0.19	0.19	4th Quartile
157	Semarang Utara	Bandarharjo	0.00	0.00	0.07	0.79	0.89	0.58	0.29	upper outlier
158	Semarang Utara	Tanjungmas	0.00	0.00	1.00	0.70	1.00	1.00	0.45	upper outlier
159	Tembalang	Kedungmundu	0.00	0.00	0.00	0.00	0.00	0.04	0.00	1st quartile
160	Tembalang	Sambiroto	0.00	0.00	0.00	0.01	0.00	0.16	0.00	1st quartile
161	Tembalang	Mangunharjo	0.02	0.00	0.00	0.01	0.00	0.09	0.00	1st quartile
162	Tembalang	Mangunharjo	0.02	0.00	0.00	0.01	0.00	0.09	0.00	1st quartile
163	Tembalang	Jangli	0.02	0.00	0.00	0.01	0.00	0.16	0.01	1st quartile
164	Tembalang	Kramas	0.04	0.00	0.00	0.01	0.00	0.04	0.01	1st quartile
165	Tembalang	Sendangmulyo	0.06	0.00	0.00	0.03	0.00	0.19	0.01	1st quartile
166	Tembalang	Tandang	0.00	0.00	0.00	0.01	0.08	0.63	0.02	1st quartile
167	Tembalang	Bulusan	0.10	0.00	0.00	0.01	0.00	0.06	0.02	1st quartile
168	Tembalang	Sendangguwo	0.00	0.00	0.00	0.01	0.12	0.41	0.02	1st quartile
169	Tembalang	Tembalang	0.20	0.00	0.00	0.02	0.00	0.02	0.04	2nd Quartile
170	Tembalang	Meteseh	0.15	0.00	0.00	0.01	0.28	0.25	0.07	3rd Quartile
171	Tembalang	Rowosari	0.90	0.00	0.00	0.05	0.19	0.45	0.19	4th Quartile

172	Tugu	Tugurejo	0.01	0.06	0.00	0.07	0.00	0.00	0.02	1st quartile
173	Tugu	Jerakah	0.01	0.02	0.00	0.13	0.00	0.00	0.03	2nd Quartile
174	Tugu	Karanganyar	0.04	0.12	0.00	0.20	0.00	0.00	0.06	3rd Quartile
175	Tugu	Randu garut	0.01	0.04	0.00	0.37	0.00	0.00	0.07	3rd Quartile
176	Tugu	Mangkang kulon	0.09	0.48	0.03	0.05	0.10	0.00	0.12	4th Quartile
177	Tugu	Mangkang wetan	0.02	0.34	0.01	0.03	0.36	0.00	0.13	4th Quartile