A Follow-up Study on Smart Divide Issues in Korean Rural Area

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Abstract Digital divide commonly means the gap among diverse stakeholders, businesses, physical areas, and individual people in terms of opportunities, accessibilities, and usabilities (Acılar, 2011). Lee and Park (2011) and Barzilai-Nahon (2006) suggested that the digital divide issues should be considered as an important public issue because proper public response may enhance or reduce the information gaps by the digital divide. This study is a follow-up study of the study of Lee and Park. This study's main aim is to clarify the changes of the digital divide in the rural areas during five years and to find out meaningful factors to reduce the gaps between the rural area and urban area. To achieve the research aim, this study analyzes the public data by ITSTAT and previous studies on the digital divide. Also this study follows the system thinking approach to model the causal relationships among diverse factors on the digital divide. With the results, this study suggests that the factors to measure the digital divide should be re-designed including smartphone penetration and accessibilities. Especially, current digital divide scoring factors should be considered in the way of social welfare.

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1 Introduction

Digital divide commonly means the gap among diverse stakeholders, businesses, physical areas, and individual people in terms of opportunities, accessibilities, and usabilities (OECD, 2001; Acılar, 2011). Lee and Park (2011) and Barzilai-Nahon (2006) suggested that the digital divide issues should be considered as an important public issue because proper public response may enhance or reduce the information gaps by the digital divide. Also they insisted that the digital divide should be considered in the view of a long-term policy rather of a short-term policy. This may mean that this issue should be consistently managed without caring the political opinions. In this regard, the governments of the U.S., EU countries, and Korea have tried to reduce the digital divide and nowadays these countries have focused on the diffusion of smart devices in the rural and non-rich people. Nonetheless, even though Korea has been considered as one of ICT industry leaders in the world, the digital divide issues between the rural and urban area is still on the debates (Lee and Park, 2011). This might mean that the digital divide issues are hard to be solved by only the public force. Also OECD (2000) and Salin (2008) insisted that the digital divide should be considered as one of the serious public issues. According to those studies, the digital divide should be treated carefully because the disadvantaged groups may be suffered by the restricted chances of employment, education, and other their lives.

According to the previous studies such as Lee and Park, the digital divide should be considered in the concept of universal services. Also these previous studies suggest that the digital divide should be considered with diverse factors including demographic and social factors. For instance, the gaps of gender, income, disabilities, residential areas, and others should be considered (Hoffman & Novak, 1998; Doshi & Gollakota, 2011; Lee and Park, 2011).

Table 1 Digital Divide Results in 2010 (Lee and Park, 2011)

Category	General index	Accessibility index	Capability	Use Frequency	Qualitative Usefulness	Smartphone Penetration
People with disabilities	18.7	6.6	27.2	26.0	33.8	89.7
Low-income people	19.5	10.5	24.2	25.9	29.5	87.8
People in Rural Area	38.2	13.8	62.8	46.6	58.8	93.6
Elderly People	32.5	6.2	60.6	50.0	51.7	93.6

Among these previous studies, Lee and Park compared the differences of accessibility, capability, usefulness, and smartphone divide (smart diffusion) among four social disadvantaged layers - people with disabilities, low-income people, the rural people, and elderly people. Their study demonstrated that the smartphone divide should be treated differently from the traditional digital divide. The traditional digital divide studies commonly focus on defining with respect to the diffusion rates and the smartphone divide also to be. Nonetheless, Lee and Park suggested that the smartphone or smart devices should be considered as a platform just as PCs and Laptops.

According to Lee and Park, the digital divide issues in Korea the rural area is closely related with the issues of current the rural area. Most important issue is people in the rural area being aged fast and their physical condition being worse. It means, the digital divide issues in the rural area is close to the mixed issues of the aged people and the disabled. In this regards, public policies to solve the issues of the digital divide in the rural area should be considered in the view of welfare development for the elderly people and the disabled.
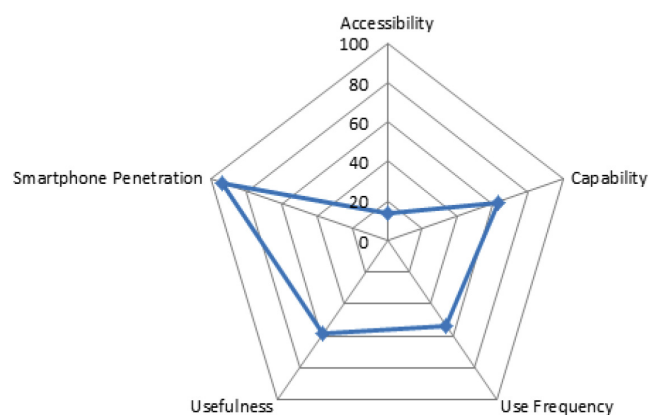
This study is a follow-up study of the study of Lee and Park. This study's main aim is to clarify the changes of the digital divide in the rural areas during five years and to find out meaningful factors to reduce the gaps between the rural area and urban area. To achieve the research aim, this study analyzes the public data by ITSTAT and previous studies on the digital divide. Also this study follows the system thinking approach to model the causal relationships among diverse factors on the digital divide.

2 Comparing digital divides in 2010 and in 2015

2.1 Summarizing the previous study on the digital divide issues of Korean rural area

Lee and Park illustrated the feature of the digital divide in the rural area to be connected with the public issue of universal welfare with analyzing public data served by a public information site - ITSTAT. Figure 1 illustrates each factor's value. In the figure, a higher factor score means a worse result - a more gap between the disadvantaged group and the ordinary group. According to the study of Lee and Park, the factor of smartphone penetration was the worst one to be supported by government or public sectors. Lee and Park explained in their study that the smartphone divide in the rural area were almost double to the low-income people. Until 2010, the digital divide of the rural area was the worst among the four disadvantaged people (ITSTAT, 2011). Interestingly, smartphone penetration rates in the four disadvantaged groups were around 90. This meant that increasing smartphone penetration in the disadvantaged groups such as the rural area was relatively important and urgent prior to other factors in 2010 (Figure 1). The smartphone penetration in Korea was at the beginning stage in 2010 - iPhone was introduced first in late 2009 - and the prices of each smartphones were relatively higher for those four groups. Based on the result and the research report of KCC (Korea Communication Commission), Lee and Park explained that the disadvantaged groups should be supported by proper public policies including reasonable and affordable device prices and monthly tariffs. In this regard, they insisted that the issues of accessibility and utilization (use frequency and usefulness) should be solved and considered positively before increasing the smartphone penetration.

Figure 1 Digital divide Index of the rural Area in 2010

2.2 Digital divides issues of Korean rural area in 2015

As a follow-up study on the digital divide issues in Korean rural area, this study adopts the recent data of ITSTAT to compare year 2010 and year 2015. From now, this study compares each detailed factors individually and supports

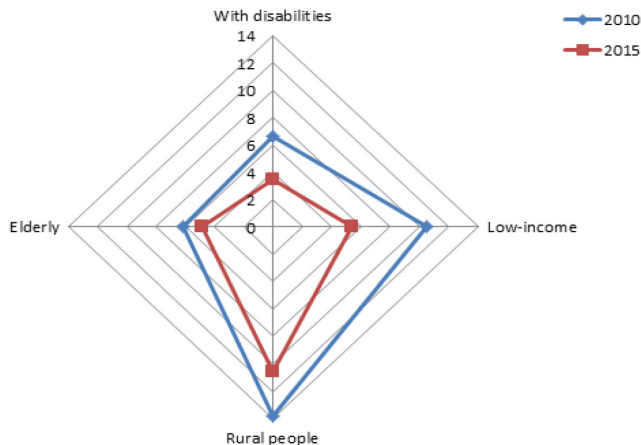### 2.2.1 Accessibility

Figure 2 Comparing accessibility of the rural group with others

Accessibility in this study means an accessibility to internet via wired or wireless telecommunication systems. the digital divide of accessibility shows interesting results. There are common beliefs that the information accessibility because Korea's internet penetration rate would exceed 90% (NIA, 2016). But Figure 2 shows a little bit different result. Still there are remarkable gaps between those disadvantaged groups and ordinary people in Korea. Especially, in the case of the rural area, it is harder to conclude the accessibility issue to be solved as expectation.

First, still the rural people show the highest divide score of accessibility and their score is around two or three times to others. And the accessibility of the rural area gap is more than 10 but all other factors were around 5. In these regards, It may mean that only the rural people may possess problems to access the requiring information and data as they want immediately.

Second, the improvement speed of accessibility of the rural area much is slower than other factors excepting the elderly groups. Nonetheless, the elderly groups have shown the first or second smallest accessibility gap from the ordinary people since 2010, so it is hard to conclude the accessibility of the rural area people to be improved more than the elderly groups.
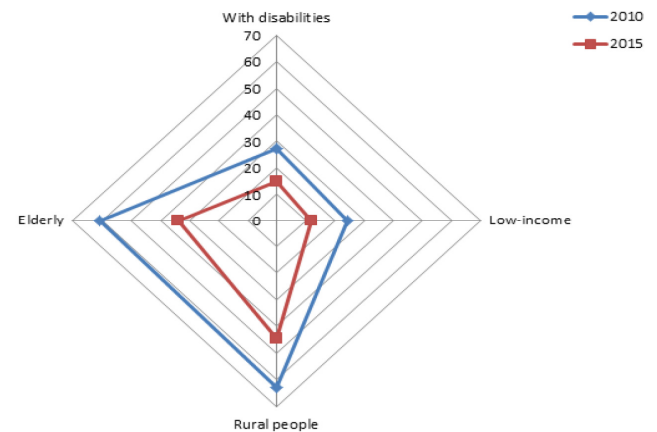
2.2.2 Capability

Figure 3 Comparing capability of the rural group with others

A capability means a personal ability to use computers and/or other devices and to use the Internet services. In 2010, capability of the rural people group and elderly group have shown almost same divide scores, but the gaps between two groups were widened in 2015 – while the capability divide of the elderly group have been shrunk more than 40%, that of the rural group have been under 30%.

This may also illustrates two important views on the digital divide issues of the rural people group. First, still the use of information system including PCs, smart devices, and others would be hard for the rural people, especially for the elderly ones in the rural areas.

Second, it seems that there may be serious residential gaps between the rural areas and urban areas. In urban areas, an user can be familiar or easily to contact the chances of be educated and guided to use information devices even though he/she would belong to elderly groups. This may mean that the public policies and welfare services should focus on supporting the rural areas more.
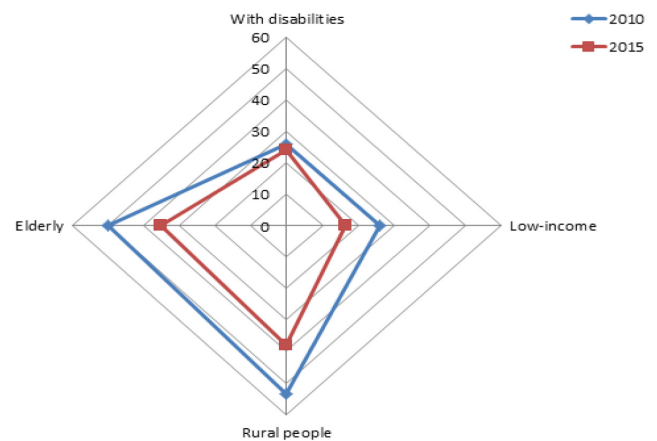
2.2.3 Use Frequency

Figure 4 Comparing use frequency of the rural group with others

A use frequency is one of the factors to measure the perceived usability on information systems and services. There are common expectations on the positive relationships between higher use frequencies and higher usability. In this regards, elderly groups and the rural people groups have shown similar divide gaps in 2010 and in 2015. This might mean that the rural people also have been familiar with understanding the usability and efficiency of information services via wired and wireless networks. Also this result may mean the public policies have focused on hardware penetration such as PCs and smart devices rather than on supporting to develop meaningful and usable applications and services. Also this might mean that several policies and welfare services have focused on encouraging low-income groups and groups with disabilities to create or to achieve new jobs while the elderly and the rural groups to be educated to use simple functions of information systems and services.

2.2.4 Qualitative Usefulness

A qualitative usefulness is also one of the factors to measure the perceived usability on information systems and services. While use freqneucy focuses on measuring the usability quantitatively, this factor is commonly used to measure the usability qualitatively. So even though the use frequency would be higher, it can be hard to understand the disadvantaged groups to use and to apply the information services and systems into their ordinary lives and works properly. According to the result (Figure 5), it seems that the rural groups and the elderly groups have been noticed that the use of information system can be positive for their works and lives. Nonetheless, still the rural people may have handicaps and weaknesses to use information systems and services – their divide score is the highest among the four groups as like other
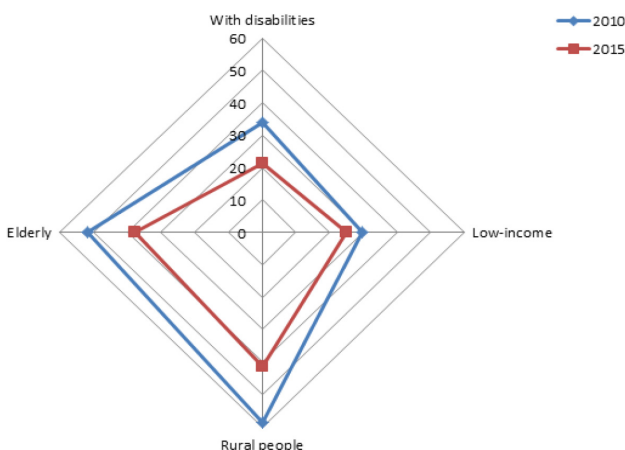
factors and they could reduce the gap around 6.6% while other groups reducing the gaps more than 10%. This result can be understood to be closely related with the the previous result of use frequency and the rural people need to be educated with more meaningful and realistic policies and supports.

2.2.5 Smartphone penetration

Korea Gallup reported that around 90% of aged 50 to 59 and 50% of aged more than 60 use smartphones already (Korea Gallup, 2015). This can be understood that the generation gap between younger users and elder users has been shrunk in terms of smartphone penetration. According to the analysis result, also the divide scores of the four disadvantaged groups have been shrunk dramatically. More detailedly, divide score of the rural people has been shrunk more than 18% per year and the current score is around 37% of year 2010. Also the score is close to the score of group with disabilities. So it can be understood the smartphone penetration is now far from the essential digital devise issue of the rural area while there is still gap between the ordinary Korean people. Interestingly, the divide score of low-income is the smallest one among the four groups. This may be caused by the lower prices of smartphones. In a few years, the prices have been dropped so fast with the rising of Chinese smartphone vendors including Huawei and Xiaomi. With increasing market shares of these vendors, Korean vendors including Samsung and LG and the Apple also have manufactured and saled the lower-price models. Even though the previous study of Lee and Park had suggested the finalcial support for the disadvantaged groups to buy the smartphones to be considered, it seems for the disadvantaged groups to hold the smartphones without or with less support.
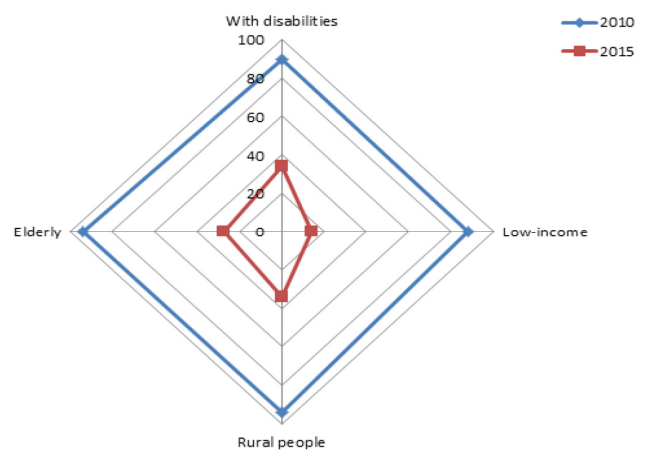

Figure 5 Comparing qualitative usefulness of each groups

Figure 6 Comparing smartphone penetration of each groups
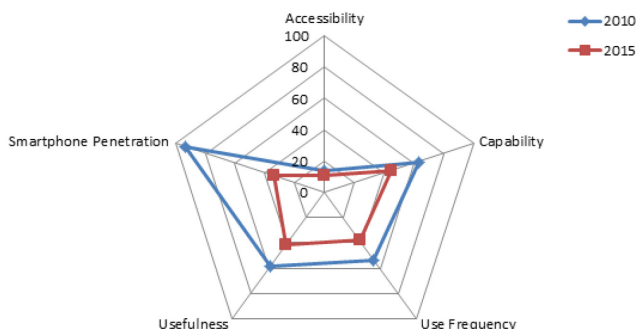
4 Conclusion & Discussion

Figure 7 The Changes of the digital divide in the rural Area

As illustrated above, there are several changes of the digital divide in Korean rural area from 2010 to 2015 (Figure 7).

Most of all, the most urgent issue in 2010 was the smartphone penetration into the rural area. but it seems to be solved in 2015. This may be due to the fast price-down of smartphones by global competition among diverse smartphone vendors. From now on, it should be considered how to encourage to develop proper smartphone applications for agricultural business. KREI's report (2013) pointed that smart technologies commonly are used with the restricted purposes such as supply chain management and quality management. Also the report pointed that enhancing the application's business domain should be positively considered (KREI, 2013).

Second, the accessibility issue in the rural area still shows the lowest divide score although there may be a gap between the rural area people and the ordinary people. In fact, since the divide score is under 10, it can be considered that the accessibility can be ignored to measure the digital divide in the rural area. It may mean that the digital divide indices should be re-considered and the traditional public policies against the digital divide should be also. For instance, Korean government have paid hundreds of millions of KRW every year and have conducted diverse public policies to support the informatazation in the rural areas, but major policies still seem to focus on increasing the accessibility with local information centers (KISTEP, 2015). It is needed to re-consider these past policies because the accessibility in the rural area may not be effectively improved.

Third, capability, use frequency, and usefulness issues show relatively weaker improvement and the divide scores are around 40%. These results may explain that the current IT educating services should be also re-considered. For instance, IT education programs should be re-designed to support the rural people's current business issues rather

to support hardware/infrastructure.

Fourth, though this study suggests several points on the gaps between the ordinary people and the disadvantaged groups, it should be concerned that the suggested digital divide indices are close to the concept of the relative divide. James (2011) explained that the relative divide – the ratio of information technology stock in the disadvantaged groups to the stock in the advantaged groups (the ordinary groups in this study) - could be reduced not only the faster diffusion speed of information technologies in the disadvantaged groups but also the slower diffusion speed in the ordinary groups. In other words, the digital divide scores could be lowered while the absolute values – such as the number of smart device users among the entire users in each groups - to be increased. In this regard, a policy maker should seriously and persistently monitor not only the relative ratio between the groups but also the absolute numbers.

Finally, Kim et al. (2009) and Larrison et al. (2002) suggest that the digital divide should be considered in the point of social impact and social welfare. Also Nowadays, Korea is close to the realization of the crisis of the aged society, especially in the rural areas (Bloomberg, 2015). In this regard, the digital divide issues of the rural area should be considered in the views of not only educating the skill to use the information systems and services and financial supports but also improving the social welfare for the people in the rural areas.

Acknowledgments

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