

A Study on the Cause Analysis of Digital Divide of Farmers and Fishermen in Korea

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Abstract - The level of information and communication technology in Korea is developing day by day, and informatization is progressing rapidly in each area of society. Currently, although many people enjoy the benefits of informatization, there are so-called information-marginalized classes who do not enjoy the benefits of informatization for various reasons. Currently, the farmers and fishermen are classified as information-marginalized class, and their information level is insufficient compared to the general people. The purpose of this paper is to analyze the causes of the digital divide by examining the current status of the digital divide among the farmers and fishermen in Korea. For this purpose, the report on the digital divide status at the national level for the last four years was analyzed, and it was revealed that the biggest cause of the digital divide was the shortage of information capacity. In this study, various plans were proposed to enhance the information capabilities of farmers and fishermen. It is expected that the research results of this paper will be widely used as a basic research work for bridging the digital divide of farmers and fishermen in the future.

Index Terms - Digital divide, Digital information index Farmers and fishermen, Information and communication technology

INTRODUCTION

In addition to the information and communication infrastructure in Korea, the spread and utilization of various information devices is evaluated as a world-class level. Many people in our society are benefiting from this informatization, but there are people in our society who do not enjoy the benefits of informatization for various reasons such as low income or physical disability. The low level of informatization limits opportunities for social participation in social services such as administration and welfare, and hinders the acquisition of new knowledge, resulting in alienation from society[1]. In particular, there is a digital divide between urban and rural areas, such as economical aspects due to the income gap between rural and urban areas, and aging of rural population.

Currently, Korea has classified low-income, disabled, farmers and fishermen, and elderly people into four information-marginalized classes and has made various efforts to reduce the digital divide by investigating the current status of their digital divide.

Assuming that the level of informatization of the general people is 100, the level of informatization of low-income, disabled, farmers and fishermen and the elderly in 2021 is 95.4, 81.7, 78.1, and 69.1, respectively[2]. The level of informatization of the information-marginalized class including farmers and fishermen is improved day by day and there is still a big gap compared to the general people. Therefore, it is necessary to investigate the digital divide status in the information-marginalized class and to identify the cause of the digital divide to resolve the digital divide.

The purpose of this paper is to analyze the causes of the digital divide among the Korean farmers and fishermen and to propose various ways to resolve the digital divide. In this study, the digital divide report at the national level was referred to identify the cause of the objective and accurate digital divide. Specifically, in this study, we tried to identify the cause of the objective digital divide as much as possible by referring to the current status report of the digital divide of the last four years of National Information Society Agency.

The rest of the paper is composed as follows: In chapter 2, the overall digital divide is introduced as a theoretical background and the related research on the digital divide of farmers and fishermen is introduced. In chapter 3, the causes of the digital divide are analyzed along with the current status of the digital divide of farmers and fishermen. In chapter 4, analysis results are interpreted and various measures are proposed to resolve the digital divide based on the analysis results in chapter 3. In Chapter 5, we discuss future research tasks along with conclusions

THEORETICAL BACKGROUND

I. Overall Digital Divide

The definitions of the digital divide vary as follows.

According to Investopedia, digital divide means “the gap between regions and demographics that have access to modern information and communications technology(ICT) and those that do not.”[3].

According to Merriam-Webster, the digital divide means “the economic, educational, and social inequalities between those who have computers and online access and those who don’t.”[4].

In the meanwhile, according to Techopedia, the digital divide means “the gap in economic and social equality that occurs when some segments of a given population don’t have equal access to ICT and reliable high-speed Internet service.”[5].

National Information Society Agency has been investigating and announcing the digital divide every year since 2002. The digital divide surveyed by the agency is based on a sample survey of the whole nation, and it announces the status of the digital divide which is very accurate and reliable. In the meantime, the digital divide was measured using so-called ‘the information divide index’ and ‘the digital information divide index’, and now it is measured as ‘digital information level’. Digital information level is an indicator to comprehensively measure the level and characteristics of the digital divide generated in mobile-based wireless and wired convergence digital environment[2]. Digital information level is composed of three indicators such as ‘access’, ‘capacity’, and ‘utilization’. The meaning of each index is as follows.

- Access

An Indicator for measuring whether computers and mobile devices are available and whether Internet use is available –

-Capacity

An indicator for measuring basic use capabilities of computers and mobile devices

- Utilization

An indicator for measuring the degree of quantitative and qualitative use of the Internet in computer and mobile device

On the other hand, the digital information level is measured as follows.

Digital information level = access level (20%) + capacity level (40%) + utilization level (40%)

II. Previous Works

There were few studies on the digital divide for farmers and fishermen. Some representative works are summarized as follows.

In [6], the study aims to examine whether the digital divide of farmers and fishermen affects the income gap. The results of the work revealed that there was a statistically significant positive relationship between level of informatization of farmers and fishermen and household income.

Kim and Sung explored the effects of attitude toward new technology, physical accessibility, and utilization technology on mobile social media use by farmers and fishermen using digital divide data[7].

The results of this work are as follows: First, the attitude toward new technology, physical accessibility, and content-related technology of farmers and fishermen had a statistically significant effect on the use of mobile social media. In particular, content-related technology has been confirmed to be the biggest factor affecting farmers and fishermen to use mobile social media. On the other hand, the influence of physical accessibility is relatively small, and media content technology has not had a significant impact on the mobile social media use by farmers and fishermen. Second, the age and residential area of farmers and fishermen were found to be the factors that caused the difference in the mobile social media use. Third, there was a significant difference in mobile social media use between part-time and full-time farmers and fishermen. The part-time farmers and fishermen are more active in using mobile social media than the full-time farmers and fishermen, and this difference is caused by the attitude toward new technology.

THE CURRENT STATUS AND ANALYSIS OF DIGITAL DIVIDE

In this chapter, we present the current status of the digital divide for the farmers and fishermen, and analyse the results as follows. The digital divide reports from 2018 to 2021 by National Information Society Agency are used for the analysis[2][8]-[10].

I. The Current Status of Digital Divide

The level of digital information in the last four years (2018-2021) for Korean farmers and fishermen is shown in Table 1. The number in Table 1 indicates the level of digital information of farmers and fishermen, assuming that the digital information level of the general people is 100.

Table 1
Digital Information Level in the Past 4 Years

	Digital Information Level
2018	69.8
2019	70.6
2020	77.3
2021	78.1

In the meanwhile, Table 2 shows the level of information access, information capacity and information utilization, which are three elements of digital information level, for the last four years.

Table 2
3 Elements of Digital Information Level

	2018	2019	2020	2021
Information Access	91.0	91.3	94.8	94.9
Information Capacity	63.0	63.6	69.0	69.6
Information Utilization	65.9	67.2	76.9	78.1

Information capacity, which is one of the 3 elements of digital information level, consists of two sub-elements: PC utilization ability and mobile device utilization ability. Also, PC and mobile device utilization ability are composed of 3 sub-elements as follows.

1) *PC Utilization Ability*

1) *Installation Capacity*

Installation capacity means the ability to install and delete software, connect the Internet to use it, and set the environment for web browsers.

2) *Use Capacity*

Use capacity means the ability to use various external devices on a PC, the ability to use the Internet to send files, and the ability to create documents and materials.

3) *Management*

Management capacity means the ability to test malware and also treat it.

2) *Mobile Device Utilization Ability*

1) *Installation Capacity*

Installation capacity means basic an ability to configure mobile device and ability to set up wireless network.

2) *Use Capacity*

Use capacity means the ability to move files to a computer, the ability to send files to others, the ability to install and use the necessary apps, and the ability to create documents and materials.

3) *Management*

Management capacity means the ability to test malware and also treat it.

Table 3 represents the level of information for three elements of PC utilization ability for the farmers and fishermen. Also, the number in Table 3 represents the level of information for the four-point scale.

Table 3
Levels of 3 Elements of PC Utilization Ability

Elements	2018	2019	2020	2021
Installation	1.97	1.88	1.94	1.95
Use	1.88	1.86	1.95	1.87
Management	1.79	1.81	1.86	1.81

In the meanwhile, Table 4 shows the level of information for the three element of mobile device utilization ability for farmers and fishermen. Also, four-point scale is used in the table.

Table 4
Levels of 3 Elements of Mobile Device Utilization Ability

Elements	2018	2019	2020	2021
Installation	2.55	2.40	2.60	2.65
Use	2.28	2.26	2.46	2.36
Management	2.04	2.12	2.20	2.14

II. Statistical Analysis of Digital Divide

In this section, we introduce the results of statistical analysis based on the digital divide data of farmers and fishermen introduced in the previous section.

Based on Table 1, the analysis results of the information level of three elements of the digital information level of farmers and fishermen are shown in Table 5.

Table 5
Analysis Results of Digital Information Level

Elements	Mean	SD	F	P
Information Access	93.00	2.14	41.46***	0.000
Information Capacity	66.30	3.48		
Information Utilization	72.03	6.36		

*** $p < 0.001$

As shown in Table 5, among the 3 elements of the digital information levels of farmers and fishermen, the average of information access is the highest at 93.00, followed by information utilization 72.03 and information capacity 66.30, and there is a statistically significant difference ($F=41.46$, $p < 0.001$). Therefore, we can say that farmers and fishermen have the highest information access and the lowest information capacity among the digital information levels.

The results of analyzing the PC utilization ability of farmers and fishermen are shown in Table 6.

Table 6
Levels of 3 Elements of PC Utilization Ability

Elements	Mean	SD	F	P
Installation	1.94	0.04	10.39**	0.005
Use	1.89	0.04		
Management	1.82	0.03		

** $p < 0.01$

The average of the installation ability was 1.94, followed by the use ability 1.89 and the management ability 1.82, and there is a statistically significant difference ($F=10.39$, $p < 0.01$).

Therefore, we can say that farmers and fishermen have the highest installation ability and the lowest management ability among PC utilization ability.

In the meanwhile, the results of analyzing the mobile device utilization ability of farmers and fishermen are shown in Table 7.

Table 7
Levels of 3 Elements of Mobile Device Utilization Ability

Elements	Mean	SD	F	P
Installation	2.55	0.11	22.30***	0.000
Use	2.34	0.09		
Management	2.13	0.07		

*** $p < 0.001$

As far the mobile device utilization ability of farmers and fishermen, the average of installation ability is the highest at 2.55, followed by use ability 2.34 and management ability 2.13, and statistically significant difference is shown ($F=22.30, p < 0.001$). Therefore, we can say that farmers and fishermen have the highest installation ability and the lowest management ability among mobile device utilization ability.

DISCUSSION

In this chapter, based on the analysis results of the digital divide for farmers and fishermen introduced in Chapter 3, analysis results are interpreted first and also various improvement plans to resolve the digital divide for farmers and fishermen are proposed.

I. Interpretation of Analysis Results

The following interpretations can be made from the analysis results of the digital divide for farmers and fishermen introduced in Chapter 3.

First, the biggest cause of the digital divide of farmers and fishermen is the lack of information capacity. In other words, among three major elements of digital information level, which is a representative indicator for measuring the digital divide, the information capacity was analysed to be the lowest. That is, among three main elements of the digital information level, information access, information capacity, and information utilization, the order in which the gap is large compared to the digital information level of the general people is information capacity, information utilization, and information access. This means that farmers and fishermen have various information devices such as PCs and mobile devices, but they do not have the ability to use these devices properly, and they cannot use them properly in various parts of everyday life.

Second, among the two factors of information capacity, PC utilization ability and mobile device utilization ability, it can be seen that farmers and fishermen lack PC utilization ability than mobile device utilization ability. This can be interpreted as follows. Compared to PCs, mobile devices such as smartphones and tablet PCs can be carried and used anywhere, making it a necessity for farmers and fishermen, so the opportunity to use mobile devices is bound to be much greater than PC opportunities. Therefore, it can be seen that the utilization ability of mobile devices that are used more often than PCs is inevitably higher.

Third, among three major elements of PC and mobile device utilization abilities, installation is the highest, followed by use and management. So, this can be interpreted as follows. Installation is the highest because installation is a necessary procedure and process to use PCs and mobile devices, and installation is not necessary frequently and can be helped by others. On the other hand, 'the use' is inconvenient to learn the function from time to time according to the convenience of the user, and the management is not necessary frequently, and only users with special interest can do it.

II. Measures to Close the Digital Divide

In this section, we propose various measures to bridge the digital divide for farmers and fishermen as follows.

First, information education for farmers and fishermen is currently being operated by various local governments[11]-[14]. Most of them are operated as collective education, and most of the educational contents focus on how to use application software. However, information education for farmers and fishermen is not operated by all local governments, and it is also operated mainly by collective education, so it is sometimes difficult to participate even if there is a will to learn. Therefore, online education by national educational institutions rather than individual collective education by local governments can be more suitable education for farmers and fishermen. In other words, consideration should be given so that farmers and fishermen can receive standardized information education contents anytime, anywhere.

Second, technical support is needed to strengthen the 'information capacity' of farmers and fishermen. In other words, in order to support the installation, use, and management of information capacity, it is necessary to establish a technical support organization that can be contacted, consulted, and taken action 24 hours a day, anytime, anywhere. These technical support organizations should be accessible through various means such as telephone, bulletin boards, and apps, and should be able to respond to farmers and fishermen as soon as possible.

CONCLUSIONS AND FURTHER RESEARCH WORKS

As modern industrialization progresses, more people flock to urban areas than farming and fishing villages, and this concentration of population has become a place where cities benefit more economically and culturally than farming and fishing villages. The development of ICT benefits all citizens, but does not benefit all citizens evenly. This is because there is a digital divide that can hinder rural areas from enjoying the benefits of ICT. As discussed earlier, the causes of the digital divide vary.

This study dealt with the digital divide of farmers and fishermen, one of the four main information-marginalized classes in Korea. Specifically, in this study, the digital divide status for farmers and fishermen was investigated and the causes of the digital divide are analysed. For objective and accurate investigation, the report on the status of the digital divide at the national level over the past 4 years has been referred. As a result of the cause analysis, it was found that the biggest cause of the digital divide of farmers and fishermen was the lack of information capacity. It was also found that among the two factors of information capacity, PC utilization ability was less than that of mobile devices. In addition, it was revealed that management ability was particularly insufficient among PC and mobile utilization ability. Based on the results of this cause analysis, a technical support plan was proposed as well as educational support for farmers and fishermen.

In order to realize an equal society, the digital divide problem must be resolved, and in particular, reducing digital divide for farmers and fishermen can be a shortcut to resolving inequality in urban and rural areas. The narrowing of the digital divide for farmers and fishermen requires various support at the national level. The follow-up research works of this study are as follows. First, for a more in-depth analysis of the cause of the digital divide for farmers and fishermen, qualitative factors such as interviews with farmers and fishermen should be considered. Second, various overseas cases should be investigated and analysed in order to revise and also enact laws to bridge the digital divide of farmers and fishermen.

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