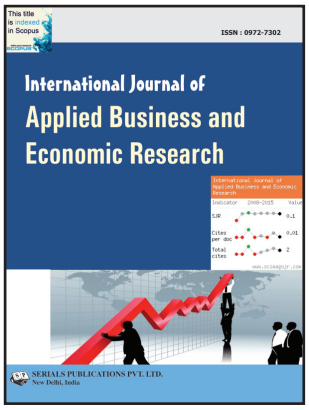


**International Journal of Applied Business and Economic Research**

ISSN : 0972-7302

available at http: www.serialsjournal.com

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**Volume 15 • Number 14 • 2017**

# Digital Divide of North Korean Defectors in South Korea: Focusing on Computer, Internet, Smart Device Capability

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## ABSTRACT

This paper is an empirical study on digital divide of North Korean defectors in South Korea. This study examined the level of digital capability of North Korean defectors which consists of Computer, Internet and Smart device capability and statistically tests its gap with the general public of South Korea. Also it examined how the gaps differ to each capability. For the analysis, it used the raw data of 'The Survey on the digital divide index and status 2014 and 2015' from National Information Society Agency of Korea. The statistical technique, such as factor analysis, reliability analysis (Cronbach-a), descriptive analysis, multiple regression analysis were performed. As a results, there was no statistically significant differences in Computer capability between North Korean defectors and general public of South Korea. It can be assumed that it is because of the informatizaiton education from Hanawon which is adaption institute of South Korea. However, there were statistically significant difference in both Internet and Smart Device capability. The size of regression coefficient which means the level of digital divide between two groups was bigger in Smart device capability model. Based on the results, this study suggests revision on informatization course in Hanawon to focus on internet and smart device education which is more helpful in real life in South Korea society to North Korean defectors.

***Keywords:*** Digital Divide, North Korean Defectors, Informatization policy.

## 1. INTRODUCTION

South Korea has best ICT infrastructure in worldwide and recently ranks top in ICT Development Index (IDI) for second straight year in 2015, 2016. Furthermore, almost of South Korea citizens (about 80%) use smart phone and their understanding level of ICT is quite high (Shin, 2016). The high informatization level brought better knowledge sharing in Korea society, however those who inexperience in using ICT naturally descend to an information alienate group (Kim et. al., 2007; Song & Kim, 2014).

On the other hand, with the division of South and North Korea, North Korean Defectors have steadily entered South Korea since 1990's. More than 1200 people of North Korean Defectors enter South Korea each year and it amounts to almost 30,000, so they become a new part of South Korea society. However, most of them have difficulties in settlements with language, socio-cultural, economic, child education problems (Choi, 2007). Especially their digital abilities fall far behind compared to South Korea citizen and they are in danger to be an information poverty group in South Korea society (Cho, 2006). In this light, N.K.D. (North Korean Defectors) need certain level of digital capability to successfully adapt to S.K. society. Also, it is important to reduce this gap to prepare future unification situation (Han, 2012; Yoon, 2007).

Therefore, this study focused on the fact that there is a gap in digital capability between general public of S.K. and N.K.D. who are newly settled in South Korea where ICT infrastructure is the best in the world. Accordingly, this study aims to empirically identify this digital divide focusing on Computer, Internet, Smart Device capabilities to use the raw data of 'The survey on digital divide index and status 2014, 2015' with multiple regression model. Also, it analyzes how the gaps differ to each capability. Finally it tries to give policy implications on informatization policy for North Korean Defectors in South Korea.

## 2. LITERATURE REVIEW

### Concept of Digital Divide

The concept of Digital divide was introduced in 1990s to explain the gap between who has information and who has not. OECD(2001) defined digital divide as a gap in the level of internet utilization for opportunities to access information and ICTs and various activities between individuals, households, enterprises, and regions (Sung, 2014). Recently, with the spread of smart phone, the discussion on digital divide has been expanded to usage level of smart device and its capability (Shin & Ji, 2014).

As the information society progressed, information became a source of added value. Accordingly, the discussion on digital divide extends beyond simple ownership to information but into how to use it to create added value (NIA, 2011). From this point of view, it has been regarded as a factor influencing social inequality phenomenon (Kim, 2007). Generally, digital divide is called 'knowledge inequality' or 'information inequality' because this concept basically starts from the idea of disparity in inequality (Lee, 2013). The reason for digital divide being social inequality factor is that it makes social demarcation and exclusion (Kim, 2007). Prior studies pointed out that people who have not information and ability to utilize information could be less participate in various area such as economy, culture, politics, social network and community, so they might be suffer from various disadvantages (Hoffman & Novak, 1999; Van Dijk & Jan, 2006; Kim, 2007). In this point, Lim(2013) argued digital divide can be defined as 'information inequality' since it keeps and deepens the gap between the rich and poor in information society and even could be combined with other inequality factor such as age, sex, education, income.

### Influence factor of Digital divide

Rapid expansion of ICT industry and elevation of informatization of society, the aspects of digital divide has been shown in complex way. Then what makes and influence on digital divide? In general, there is a close relation between digital divide and socioeconomic background (Yoo, 2004). Norris (2001) explained

gap which occurs in new information society is related to inequality structure in existing society and age, sex, race, income, education level are the main influencing factors on digital divide. Commonly, prior studies found age, gender, education level, income, region have effect on digital divide (Kim, 2007; Kim & Min, 2006; Suh, 2000; Yoo, 2003).

From the perspective N.K.D. are immigrants, there are many research on digital divide of immigrants. Korup & Szydlik (2005) studied digital divide between Turkish immigrants and general public in Germany, it found human capital, family background, and social background factors affect digital divide in Germany. Ono & Zavodny (2007) researched on digital divide of immigrants in US, they found immigrants show gap both in information access and utilization and language ability has a major impact on it. Chiswick & Miller (2007) also found that linguistic ability is main influence factor in digital divide of immigrants in Australia. Seol & Ko (2012) explored the determinants of information gap of marriage immigrants in South Korea. It found age, sex, period of residence, education level of immigrants, spouse, region, class, home country are comprehensively influence on digital divide of marriage immigrants in S.K. society. Lee & Jang (2010) researched factors that cause information literacy gap in migrant workers of S.K. by in-depth interview with migrant workers in S.K. and NGO practitioner. In this study, it reveals that social factors together with individual factors such as the presence of Korean language education, duration of stay in Korea, age, marital status, occupation, social activity, and social network are combined and influence to their information literacy gap.

## Current state of North Korean Defectors in South Korea

As stated in the Law Concerning the Protection and Settlement of North Korean Refugees, North Korean defectors are persons who have an address, immediate family, spouse, or workplace in North Korea and who have not acquired a foreign nationality after leaving North Korea. Previously, they were called North Korean escapee, North Korean compatriots, and the government encouraged them to use the term 'settler' in the sense of 'starting a life in a new home.' However, since North Korean defectors expressed their refusal to be called "settlers" and preferred to be named as North Korean defectors, they have been officially designated as "North Korean defectors" (Kim, 2012).

According to the Korea National Statistical Office, North Korean defectors began to increase steadily in the mid-1990s due to North Korea's deteriorating food situation. The number of North Korean defectors has reached 100 in 1999, more than 1,000 in 2002 and more than 2,000 in 2006. In 2007, the total number of immigrants exceeded 10,000, and reached 20,000 in November 2010. In 2016, the accumulated number reached around 30,000. The reason for the surge in North Korean defectors' entry into the country since 2000 could be in search of a better life in the situation where North Korean refugees feel limitation to the risk of repatriation during their 4-5 year overseas stay (Ministry of Unification, 2014). In addition, the Korean governments' support for refugees entering South Korea embassy in the third country and the support of families who have already arrived in South Korea seem to have an impact on their increase of entrance (Ministry of Unification, 2014). Government of South Korea has embraced them in accordance with international law such as domestic law and UN refugee treaty under the principle of accepting humanitarianism and homosexuality when N.K.D. who are staying in foreign countries wish to go to Korea (Ministry of Unification, 2014).

### Digital Capability of North Korean Defectors in South Korea

It is natural that North Korean Defectors who have lived in North Korea for a long time have a difference level of digital capability among general public of South Korea which has the world's fastest internet users and the majority citizens using smart phone. North Korea has continued its national efforts to develop information and communication in the 2000s, despite these efforts, South Korea has achieved the highest level of information technology in the world, so significant digital divide is occurring between the two Koreas (Park, 2011). According to the report from 'the survey on the digital divide index and status 2014' by Korea National Information Society Agency (NIA), the level of informatization of N.K.D. was 94%, 66.7% and 75.4%, respectively compared to the general public of South Korea (Table 33.1). N.K.D's level of informatization in the access sector which means PC and Internet access was relatively high. However the gap in capability sector indicating the level of computer and internet utilization was quite significant. As can be seen in Table 33.1, gap between them has generally improved by year. However, there was still a considerable gap in the capability sector. In this regard, in order to solve the digital divide of N.K.D. in S.K., it could be assumed that the capability sector gap should be focused on.

**Table 33.1**
**The level of Gap among N.K.D by year compared to the general public of S.K.**

| *Sector* | *2011* | *2012* | *2013* | *2014* |
|---|---|---|---|---|
| Access | 84.0% | 86.9% | 89.4% | 94.0% |
| Capability | 49.3% | 56.2% | 57.6% | 66.7% |
| Utilization | 53.0% | 70.5% | 72.2% | 75.4% |

## 3. RESEARCH METHODS

### Research Question and Hypothesis

This study tries to empirically examine the level of digital capability of N.K.D. which could be in danger to become a new information disadvantaged group in S.K. society. And it tests statistically whether there is a significant difference compared to that of general public of S.K. Ultimately, this study aims to derive practical policy support measures to enhance the level of digital capability of N.K.D and effectively reduce the digital divide. Therefore the research question of this study is "Is there a statistical significant difference between the N.K.D and general public of S.K. in digital capability?". The following research hypothesis were drawn to examine the gap in digital capability (Computer, Internet and Smart Device) between the general public of S.K. and N.K.D.

**H1:** Computer capability of North Korean Defectors is lower than that of general public of South Korea. (–)

**H2:** Internet capability of North Korean Defectors is lower than that of general public of South Korea. (–)

**H3:** Smart Device capability of North Korean Defectors is lower than that of general public of South Korea. (–)

## Used Data

For the analysis, this study used the raw data of 『The Survey on the digital divide index and status 2014, 2015』 from National Information Society Agency (NIA). The survey population of the 2014 the survey is the "general household member who lives in households over 7 years of age nationwide as of August 1, 2014", and the same applies to the data for 2015 (NIA, 2014; 2015). A survey population of N.K.D was "As of August 1, 2014, the Korean nationals from North Korea who are over 7 years old and registered by the Law for the Protection and Settlement Support of North Korean Refugees" and also the same applies to the data for 2015(NIA, 2014; 2015). The number of available samples of N.K.D. were 361 and general public of S.K. samples were 8,455.

## Variables and Measures

In this study, the dependent variables are computer, internet, smart device capability and independent variable is group characteristics (N.K.D or general public of S.K.). Age, sex, education level, monthly income and type of job are used as control variables based on prior studies (Chiswick & Miller, 2007; Kim & Kim, 2002; Lee et. al., 2009; Schiller, 1996; Seol & Ko, 2010; Son, 2008; World bank, 2001).

All variables are measured through questionnaire items of 『The Survey on the digital divide index and status 2014, 2015』 and the questionnaire consisted of self-assessment about ability level by 4-point scale.

**Table 33.2**
**Measurement of Variables**

| *Variable* | | *Measurement items* | *Measurement* |
|---|---|---|---|
| Dependent variable | Computer capability | 1. OS and Utility program (Window, Linux, etc)<br>2. Word Processor (MS word, Hancom office)<br>3. Spreadsheet (excel)<br>4. Computer game<br>5. Multimedia Program (Music and video play software)<br>6. Presentation program (Powerpoint)<br>7. Computer graphic program (Photoshop, Illustrator, Flash etc)<br>8. Opening a personal homepage (Include homepage production) | The arithmetic mean of the values measured with each items |
| | Internet capability | 1. Search information<br>2. Chatting (messenger)<br>3. E-mail<br>4. Online game<br>5. Multimedia based internet<br>6. Online transaction<br>7. E-government and online participation | |
| | Smart device capability | 1. Manage settings of device<br>2. Set up wireless network of device<br>3. File transferring device to computer<br>4. Search, download, update, delete applications on device<br>5. Scan and clean the virus on device<br>6. Write a document with device | |

| *Variable* | | *Measurement items* | *Measurement* |
|---|---|---|---|
| Independent variable | Group Characteristics | • General public of South Korea = 0<br>• North Korean Defectors = 1 | Dummy variables |
| Control variable | Age | | Continuous variable |
| | Income | • Below 50 = 1/50 – 99 = 2/100 – 149 = 3/150 – 199 = 4/ 200 – 249 = 5/250 – 200 = 6/300 – 349 = 7/350 – 399 = 8/ 400 – 499 = 9/500 – 599 = 10/over 600 = 11 | |
| | Sex | • Female = 0<br>• Male = 1 | Dummy variables |
| | Education | • Below elementary school = 1/middle school = 2/high school = 3/above college education = 4 | |
| | Job | • Not employed = 0 (dummy reference)/Management, office = 1/Service, sales = 2/Agriculture, fishery = 3/ Mechanic = 4/ Simple labour = 5/Student = 6 | |

### Method of Analysis

For the analysis, factor, reliability (Cronbach-a), descriptive analysis and multiple regression analysis were performed. First, it checked the validity and reliability of measurement 8 items for computer, 7 items for Internet and 7 items for Smart device capability which are the dependent variables in this study. Factor analysis was performed to assess the validity of measurement items and they were verified with Cronbach-a coefficient. Next, descriptive analysis was performed to check the descriptive statistics of the key variables and general characteristics of the samples. Finally, multiple regression model was performed to test digital capability gap between the general public of S.K. and N.K.D. by multiple regression analysis. All the analysis were performed with STATA 14.1.

## 4. ANALYSIS RESULTS

### Factor Analysis and Reliability Analysis

Since dependent variables which are computer, internet, smart device capability used in this study are measured with the several questionnaire items, it is necessary to verify how accurately they measure the concepts. Firstly, factor analysis was conducted to analyze the validity of measurement. Factor analysis used principal component analysis and Varimax rotation to extract components with eigenvalues greater than 1. All items in the component value of these variables are more than 0.7. Secondly, for reliability analysis, the Cronbach-coefficient of each variable was measured. The reliability coefficients of each item are 0.9078, 0.9173, and 0.9685, respectively, so all items of dependent variables are used without modification.

### Descriptive Analysis

Prior to main analysis, it examined the descriptive statistics on the key variables. Table 33.3 shows the descriptive statistics of dependent variables. The average of computer capability of N.K.D. is 2.015 and it is slightly lower than that of general public of S.K.(2.133). Regarding Internet capability, the gap of average value between two groups is bigger than the computer capability. In smart device capability, the

average value of general public of S.K. is 2.876 while that of N.K.D. is 2.383 and it is the biggest among three variables.

**Table 33.3**
**Descriptive statistics of dependent variables**

| *Variables* | | *Obs* | *Mean* | *S.D.* | *Min* | *Max* |
|---|---|---|---|---|---|---|
| Computer capability | General public | 8,465 | 2.133 | 0.652 | 1 | 4 |
| | N.K.D. | 361 | 2.015 | 0.573 | 0.891 | 3.75 |
| Internet capability | General public | 8,465 | 2.605 | 0.700 | 1 | 4 |
| | N.K.D. | 361 | 2.222 | 0.645 | 0.877 | 4 |
| Smart device capability | General public | 8,465 | 2.876 | 0.728 | 1 | 4 |
| | N.K.D. | 361 | 2.383 | 0.824 | 0.877 | 4 |

Table 33.4 shows the descriptive statistics of control variables in this study. Also, it shows general characteristics of the samples. Total number of the general public of S.K. is 8,455 and N.K.D is 361. The respondents of N.K.D. is consists of 61.7% female and 38.2% male. As for education level, almost half of them are have more than a high school graduation level, however only 9.4% of them are more than college graduate. 27.7% of them are students, 14.96% of service workers and 14.13% of simple laborers are in order. More than half of the samples are less than 1.5 million won monthly income.

Regarding the general public of S.K., male is 52.4% and female is 47.6%. As for education level, 45% of them are more than a high school graduation education level, and 34.8% are more than college graduates. 28.91% of them are Service and Sales workers and students are 23.95% and management and office workers are 22.37%. In monthly household income, 20.84% of them have 4-4.99 million won and 20.25% have 3-3.49 million won. There are less than 10% who have below 2 million won of monthly household income.

**Table 33.4**
**Descriptive statistics of Control variables**

| *Variable* | *Contents* | *The general public* | | *North Korean Defectors* | |
|---|---|---|---|---|---|
| | | *Frequency (person)* | *Percent (%)* | *Frequency (person)* | *Percent (%)* |
| Sex | Female | 4,027 | 47.63 | 223 | 61.77 |
| | Male | 4,428 | 52.37 | 138 | 38.23 |
| Education | Below Elementary | 677 | 8.01 | 53 | 14.68 |
| | Middle School | 1,029 | 12.17 | 98 | 27.15 |
| | High School | 3,807 | 45.03 | 177 | 49.03 |
| | College | 2,942 | 34.80 | 33 | 9.14 |
| Job | Not employed | 1,270 | 15.02 | 84 | 23.27 |
| | Management, Office | 1.891 | 22.37 | 20 | 5.54 |
| | Service, Sales | 2,444 | 28.91 | 54 | 14.96 |
| | Agriculture, Fishery | 140 | 1.66 | 19 | 5.26 |
| | Mechanic | 560 | 6.62 | 33 | 9.4 |
| | Simple laborer | 125 | 1.48 | 51 | 14.13 |
| | Student | 2,025 | 23.95 | 100 | 27.70 |

| Variable | Contents | The general public | | North Korean Defectors | |
|---|---|---|---|---|---|
| | | Frequency (person) | Percent (%) | Frequency (person) | Percent (%) |
| Income | Below 50 | 19 | 0.22 | 47 | 13.02 |
| | 50-99 | 70 | 0.83 | 97 | 26.87 |
| | 100-149 | 196 | 2.32 | 87 | 24.10 |
| | 150-199 | 370 | 4.38 | 70 | 19.39 |
| | 200-249 | 781 | 9.24 | 41 | 11.36 |
| | 250-299 | 984 | 11.64 | 17 | 4.71 |
| | 300-349 | 1,712 | 20.25 | 2 | 0.55 |
| | 350-399 | 1,126 | 13.32 | – | – |
| | 400-499 | 1,762 | 20.84 | – | – |
| | 500-599 | 1,021 | 12.08 | – | – |
| | Over 600 | 414 | 4.90 | – | – |

## Multiple Regression Analysis

This study performed a multiple regression analysis on three models to verify research hypothesis[1]. As for Computer capability, there is no statistically significant difference between N.K.D. and general public of S.K.. In the previous descriptive statistics, the mean value of the computer capability of the general public is 2.133, and that of the computer capability of N.K.D is 2.015. The mean value of computer capability of N.K.D is slightly lower than that of general public of S.K., but this difference is proved to be not statistically significant. In this case, it can be assumed that it is because N.K.D are required to go to Hanawon after entering South Korea and receive social adaptation education which includes basic informatization curriculum. According to the press release from the Ministry of Unification (March 27, 2015), Hanawon operates computer education curriculum for 35 hours and it includes educational content that can improve computer skills such as Hangul, typing exercises, basic writing and editing.[2]

Regarding Internet capability, there is statistically significant difference between two groups and its coefficient was −0.189 ($p < 0.001$). In this regard, it can be assumed it is because North Korea's internet is thoroughly controlled by the government (Joong Ang Daily, April 6 2016). Since the North Korean government have strict control over the Internet thus North Korean citizens would be unfamiliar with the free internet use and their internet capability may be very low. However, only 10 hours of internet education are allocated in basic informatization curriculum which is quite insufficient compared to computer education (Ministry of Unification, 2015).

Lastly, as for the smart device capability, there is also statistically significant difference between two groups and its coefficient was −0.31($p < 0.001$) and it is bigger than that of Internet. From the result, the digital divide become worsens in more advanced technology. As mobile-based information becomes more

[1] VIF of each model is 1.88(min 1.15~max 4.27) and it can be assumed that there is no multicollinearity problem in all models.

[2] Ministry of Unification Press Release (March 24, 2014). "Hanawon Computer Training (total 35 hours): Δ computer Training Overview (3 hours) ΔH/W and O/S Basics (1 hour) Δ Typing Practice (4 hours) Δ Basic Document Creation (4 hours) (3 hours) Δ Comprehensive basic document preparation (2 hours) Δ Compose resume and self introduction (3 hours) Δ Overview of information and communication (1 hour) Δ Information search (6 hours) Δ E-mail use (4 hours) 1 hour) Δ Computer education evaluation (3 hours)"

widespread (Shin & Ji, 2014), it seems that the need for smart device utilization education for N.K.D is very necessary.

Regarding the control variables, the effect of age, sex, education, income variables show similar patterns in each capability and all of coefficients are significant. Also, about job dummy variables which have reference on Not-employed, Management, Office job and Student variables are significant in all three models.

**Table 33.5**
**Multiple Regression Analysis**

| | *Computer Capability* | *Internet Capability* | *Smart Device Capability* |
|---|---|---|---|
| N.K.D | 0.0373 | –0.189*** | –0.317*** |
| | (1.13) | (–5.35) | (–8.51) |
| Age | –0.0155*** | –0.0169*** | –0.0199*** |
| | (–26.37) | (–26.65) | (–29.89) |
| Sex | 0.103*** | 0.0977*** | 0.0879*** |
| | (8.07) | (7.13) | (6.09) |
| Education | 0.226*** | 0.303*** | 0.288*** |
| | (24.12) | (30.18) | (27.14) |
| Income | 0.0135*** | 0.0174*** | 0.0179*** |
| | (4.39) | (5.25) | (5.13) |
| Management, Office | 0.298*** | 0.218*** | 0.233*** |
| | (13.77) | (9.36) | (9.50) |
| Service, Sales | 0.00669 | –0.0168 | 0.0681** |
| | (0.34) | (–0.80) | (3.08) |
| Agriculture, Fishery | –0.0365 | –0.0640 | 0.00285 |
| | (–0.77) | (–1.26) | (0.05) |
| Mechanic | –0.0133 | –0.0379 | 0.0925** |
| | (–0.46) | (–1.23) | (2.85) |
| Simple Laborer | –0.0494 | –0.0642 | –0.0555 |
| | (–1.09) | (–1.32) | (–1.08) |
| Student | 0.298*** | 0.266*** | 0.292*** |
| | (10.57) | (8.77) | (9.13) |
| N | 8816 | 8816 | 8816 |
| $R^2$ | 0.288 | 0.296 | 0.295 |

*t* statistics in parentheses.
*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

## 5. CONCLUSION

From the results of this study, there is no statistically significant gap in computer capability between the general public of S.K. and N.K.D. It can be assumed it is because North Korean Defectors mandatorily enter 'Hanawon' to complete their adjustment education in South Korea Society. It has curriculum which contains education for using computer and its portion is somewhat higher in that course, so they may be

have certain level of Computer capability which is not behind compared to the general public of Korea. Regarding Internet Capability, it can be supposed that the internet of North Korea is strictly controlled by government so N.K.D. could be less familiar with using internet naturally. Lastly, the results show that N.K.D are relatively inexperienced in using Smart device compared to general public of S.K. a lot. The size of smart device capability gap is bigger than that of the internet. It indicates that the digital divide of N.K.D. worsens along with the higher level of ICT abilities. Based on the above results, the policy implications of the North Korean defectors' information policy are as follows. The informatization course of Hanawon mainly focused on computer use ability, and internet education was only one third (10 hours) of the whole education time. Considering the situation of North Korea where the internet is completely blocked by the government and the residents' Internet access level is very low, the proportion of internet use education of Hanawon should be increased and strengthened. Also, as for the contents of internet education, it is better to be revised more practically with introducing various internet services that are essential for real life in South Korea.

## Acknowledgments

This work was supported by the National Research Foundation of Korea Grant funded by the Korean Government (NRF-2014S1A3A2044645).

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