

Internet option for improving the efficiency of Population and Housing Census in Korea

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Abstracts

Statistics Korea conducts its population and housing census every 5 years. This provides basic data for policy-decisions related to low birth rate, aging population, and housing. However, the environment for census collection via field survey is getting worse. The cost of every census cycle has increased significantly. The number of single-person households and double-income households have continued to increase, making it difficult for interviewers to meet their respondents. Finally, people want to protect their privacy from others, including interviewers. The internet option for population census can alleviate these problems and improve the efficiency of census collection. In Korea, the internet penetration rate is more than 82%. Statistics Korea took full advantage of the internet in 2010 population and housing census, with 47.9% of respondents participated through the internet option. As a result, Korea was able to experience the benefits such as saving cost, reducing respondent burden, and improving data accuracy. This paper will share Korea's experience and success factors of the internet option for 2010 census, and so give some useful information to others who are considering the internet option for their Census.

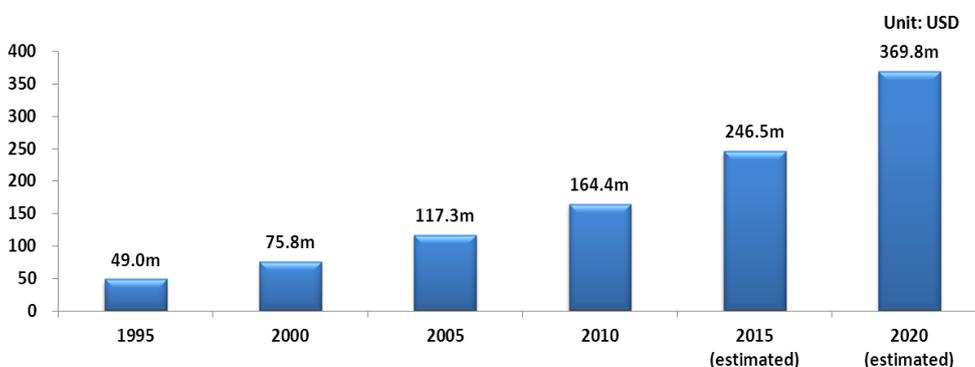
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1. Introduction

Statistics Korea conducts its population and housing census every 5 years. This provides basic data for policy-decisions related to low birth rate, aging population, and housing.

However, the environment for census collection via field survey is getting worse. The cost of every census cycle has increased significantly. As <Figure 1> shows, 2010 census cost 164 million dollars, which was more than twice the cost of the 2000 census. The costs of every census since 2000 has been 50 % more than the previous census. Thus, Statistics Korea is facing a criticism to conduct its census using traditional method (full enumeration via field survey).

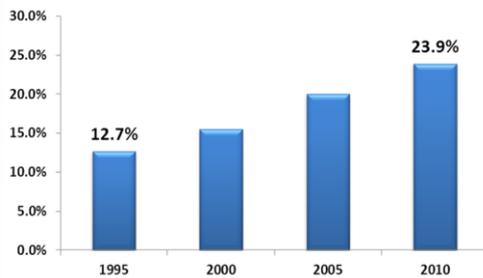
<Fig. 1: Cost trend of the traditional census (1 USD = 1,100 KRW)>



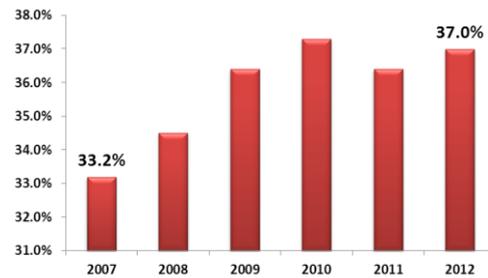
(Source: Population Census (Statistics Korea))

An important reason for the increase in costs has been the significant increase in the number of single-person households and double-income households. In Korea, single-person households has increased every year, and reached 23.9% of whole households (See <Figure 2>). This means that the size of a household is smaller than past one, so makes it difficult for interviewers to meet their respondents. To make matters worse, double-income households have continued to increase. With most single-person and double-income households not available during the day, it is now difficult to meet many households during the day time, when the interviewing is done.

< Fig. 2: One person household rate >



<Fig. 3: Double income household rate >



(Source: Population Census, Household Income and Expenditure Survey (Statistics Korea))

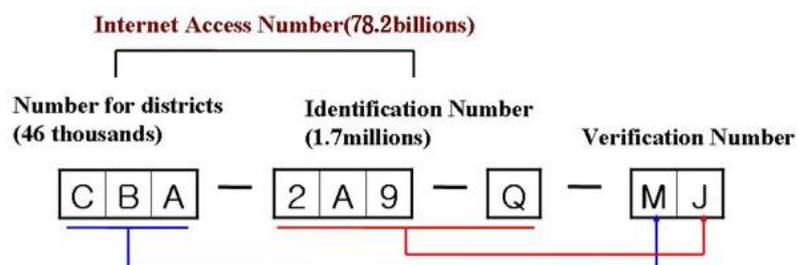
Another difficulty of census collection via field survey is that people want to protect their privacy from others, including interviewers. This raises the possibility of nonresponse or insincere response on questionnaire. In fact, Statistics Korea suffers from the problem that nonresponse rate of survey is continuously increasing.

2. Background to Internet Option

For improving efficiency of Population and Housing Census, Statistics Korea was interested in using internet. The internet option on Korean Census was first introduced in 2005. At that time, the participation rate of internet option was only 0.9%. It was very lower than other country like Canada, Australia. However, with the experience gained from 2005 census, Statistics Korea made efforts to increase the participation rate of internet option for 2010 Census.

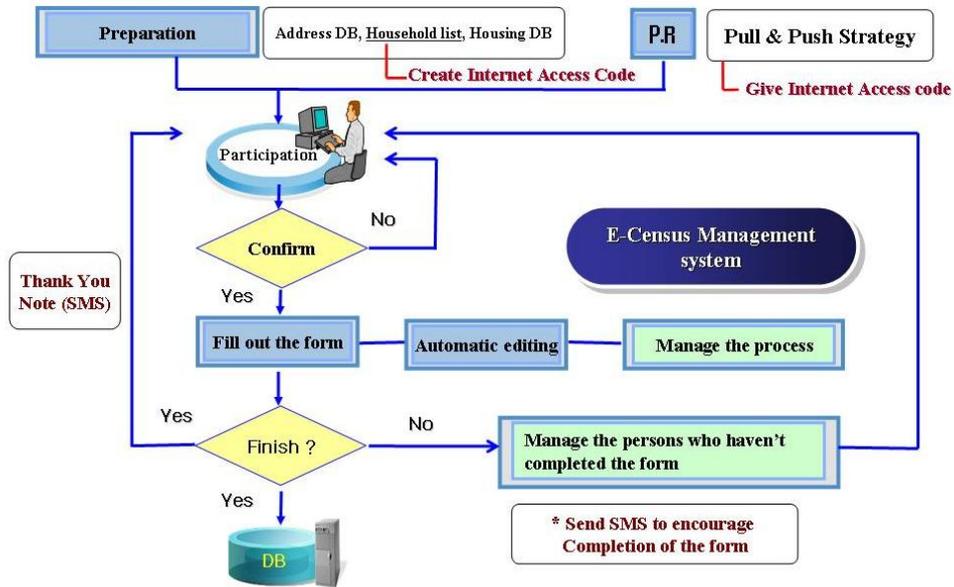
First, Statistics Korea improved the convenience of E-Census System which was constructed in 2005. Using this system, Statistics Korea conducted internet option in the 4 pretests and a rehearsal for 2010 Census. Unlike 2005 Census, Statistics Korea created a unique "internet access code" and distributed it to each household during the preparatory period. For this, address DB, household DB and housing DB are established in the preparation phase of census. Internet access code consisted of 9 digits in order to ensure uniqueness. (It can produce about 78 billions of different access code while the number of households in Korea is about 19 millions.)

<Fig. 4: Internet Access Code with 9 digits >



Each household was able to access the internet option of census by logging onto the census web pages using a given access code. The general process of participating internet option was as follows:

<Fig. 5: A process of internet option>

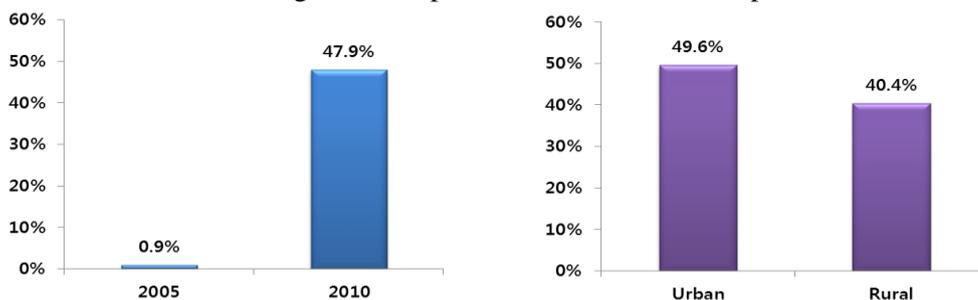


As a result of thorough preparation, Statistics Korea was able to greatly enhance the participation rate of internet option for 2010 census. This paper will share Korea's experience and explain success factors of internet option.

3. Census Result - Enhanced participation rate of the internet option

One of the 2010 Census achievements was a high participation rate of internet option. In 2010, 47.9% of households participated through the internet option, compared with 0.9% in 2005.

<Fig. 6: Participation rate of the internet option>

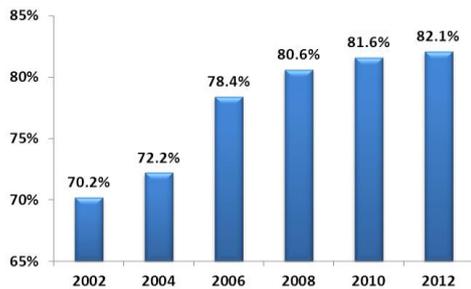


(Source: Population Census (Statistics Korea))

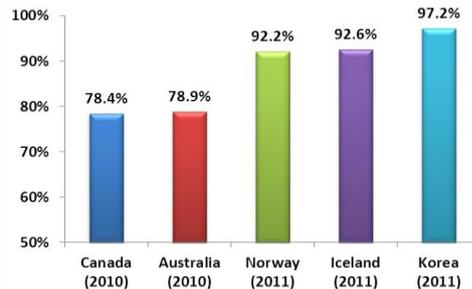
High internet penetration in Korea, convenient service system, and effective public relations strategy were factors behind the success of the internet option for 2010 Census. Korean internet penetration was above 81% in 2010, and now it reaches 82%. The number of personal computer per household is more than 0.9. These mean that almost all Koreans are accustomed to using the internet, and (as Figure 8 shows) have a higher internet penetration rate than many other countries. Moreover, as mobile internet and smart devices have spread quickly, it is hard to find an area in Korea

where people cannot access the internet. This infrastructure shows how widely the internet survey can be applied in Korea.

<Fig. 7: Internet penetration rate in Korea>



<Fig. 8: Internet penetration rate(including mobile)>



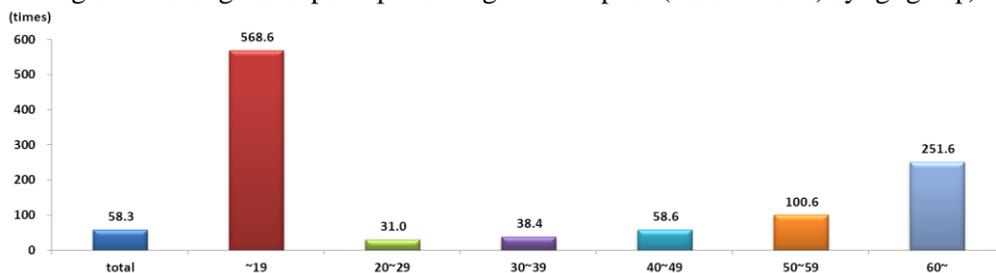
(Source: ICT usage Survey (Statistics Korea), OECD Key ICT indicators (OECD))

The improved convenience of service was also a success factor for the internet option. In 2005, when Statistics Korea first introduced the internet option, there was not enough time to prepare. In some regions, the address DB was incomplete, so it sometimes took more than 24 hours to give respondent a unique internet access code. To make matters worse, the service web page was too complex for respondents to participate through the internet option.

In 2010, Statistics Korea had enough time to prepare internet option for census and conduct several pretests on it. The address DB and household list were completed during the preparation phase of census. This meant that Statistics Korea could give a unique internet access code to almost all respondents. Moreover, the web service for internet option was improved so that respondent could access and fill the form easily.

Another success factor is using Pull and Push strategy. Pull strategy means what inducing households to take part in the internet option, whereas Push strategy means what forcing households to participate in the internet option. As a Push strategy, Statistics Korea offered internet option before conducting field survey. This forced households to participate in the internet option by not distributing paper questionnaires during internet option period. As a Pull strategy, Statistics Korea conducted public campaign to encourage households participating through the internet option. In addition, providing some incentives needed to their children, Statistics Korea motivated households to participate through the internet option. In Korea, students must do voluntary service for given hours every year. Statistics Korea use it as an incentive for census participation through the internet option. If a student completed the forms on the internet, Statistics Korea gave him/her a guarantee of two-hour voluntary service. As a result, participants of children using the internet option were about 803 thousands in 2010 census, which was noticeably improved compared with 2005 census.

<Fig. 9: Increasing rate of participants using internet option (2005 → 2010) by age group>



(Source: Population Census (Statistics Korea))

4. Census Result - Improved accuracy of data

Another achievement of 2010 census was the improved accuracy of census data by using internet option. In relation to coverage (omission and duplication), the internet option was better than interview option. Based on the result of post-enumeration survey for 2010 census, the omission rate of internet option was 0.2%, lower than 1.24% of interview option. The duplication rate of internet option was 0.14%, lower than 0.44% of interview option.

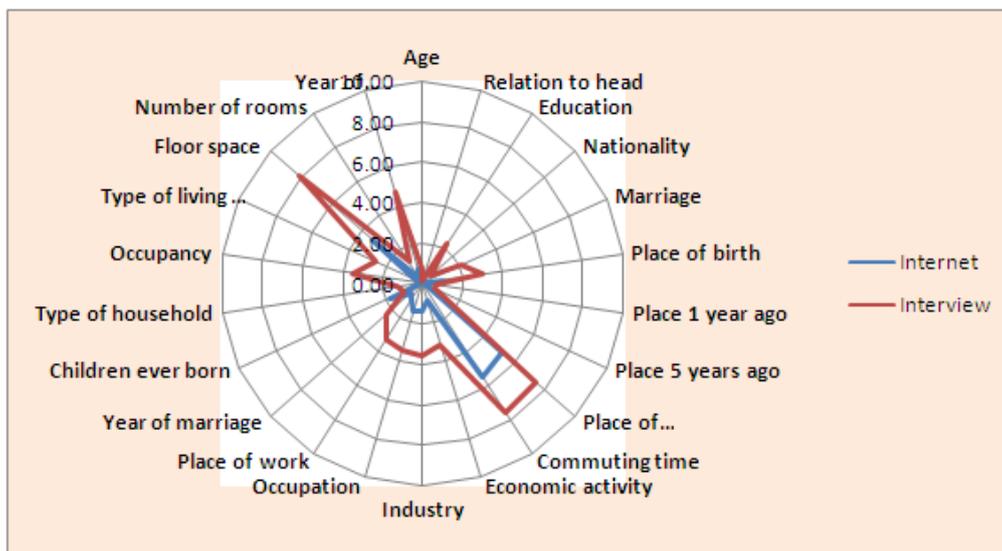
<Table 1: Omission and duplication rate (internet vs. interview)>

	Internet	Interview
Net omission rate	0.06	0.80
Omission rate	0.20	1.24
Duplication rate	0.14	0.44

(Source: Population Census (Statistics Korea))

The number of response errors per household was 0.3 by internet option, whereas it was 0.9 by interview option. This means that the data collected by internet option was more accurate than the interview option. As seeing by major census items, the response error number of internet option was lower than one of interview option.

<Fig. 10: Response error number of internet and interview option by major census items>



(Source: Population Census (Statistics Korea))

The reason that the internet option is more accurate than the interview option can be found in the difference between internet and paper. In the internet option, it is possible to check the validation of data as soon as respondent answers the questionnaire. In fact, the internet option for 2010 census had 88 rules for short-form and 227 rules for long-form to check input data. This prevents respondent's mistakes in advance. However, excepting the eye-checking of interviewer, the interview option based on paper questionnaire could check the validation of data after the response.

Another factor of improving accuracy is the optimized response path. The internet option can select the following questions according to the respondent's previous answer, so the respondents can read and answer only needed questions. However, in the interview option, respondents need to check whether they need to answer every question or not. Therefore, the internet option is easy for respondents to answer the questionnaire and to avoid mistakes.

5. Conclusion

The internet option is very effective to improve the efficiency of Census collection. It is free from temporal and spatial constraints, so respondents can participate easily at anywhere, at any time. Moreover, the internet option can prevent respondent's mistakes in advance, so the quality of census data can be improved.

In the experience of Statistics Korea, in order to introduce the internet option for census successfully, the infrastructure for internet use should be well-set up in advance. In the aspect of public relations, the Pull and Push strategy is effective to enhance participation rate. Appropriate incentives make the participation rate higher, so it is good to find out some incentives which are interested to all of respondents. The service system for the internet option must be easy to use. In the future, the mobile internet option using a smart device will be considered.

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