

Enabling Sustainable Broadband Adoption in Rural Areas

A Case Study of Information Network Villages in South Korea



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Abstract

Due to distance and low density, rural areas are often disadvantaged in getting access to telecommunication infrastructures. Hence rural digital divide policies tend to focus on providing access. While narrowing the access gap has been largely effective in developed countries, it is what happens after getting access that is more important than connectivity itself. Connectivity must be followed by effective utilisation of the technologies in order for it to be beneficial to individuals and communities. This study examines South Korea's Information Network Village (INVIL) project as an exemplary policy of sustainable broadband adoption in rural areas. The program was designed to narrow the digital divide between urban and rural areas, create new sources of revenue and to build sustainable rural communities. Due to this multi-layered and long-term approach, the villages have been successful in narrowing the digital divide, not only in terms of access but also in effectively utilising broadband to enhance the local economy and build cohesive communities. The outcome of the program was evaluated based on the policy framework. Then a case study of three INVILs was conducted to provide an in-depth assessment of the program's outcome. The unique feature of the program is that it emphasises investment in human capital rather than infrastructure and includes a long-term vision for each local community. This motivates local residents to be active participants in the program. Beyond the provision of high-speed networks, continuous programs that are tailored to local needs are necessary in order to facilitate sustainable broadband adoption.

Keywords: digital divide; ICT; South Korea; digital policy; rural issues; Information Network Village program

Introduction

We live in an information society where the ability to engage in various social and economic transactions is becoming a distinct advantage. Governments, companies and individuals are increasing their online presence, and those who do not have access to, or the capacity to utilise the resources are experiencing a new type of social exclusion; namely, digital exclusion.

Laying telecommunications infrastructure in rural areas is economically less viable because of distance and low density. Thus the digital divide between urban and rural areas has always been a policy issue. In countries like South Korea, rural areas overlap considerably with agricultural and fishery communities, which have been identified as disadvantaged groups in terms of both social and digital exclusion. The provision of broadband in rural communities is an initial step towards overcoming the digital divide. However, access alone does not guarantee beneficial uses. Effective uses must follow, in order to result in

user benefits. Rather than the notion that providing access will bridge the gap automatically, we need to address the issue of effective uses (Gurstein, 2003). Beyond connectivity, there must be content available to users and users need the capacity to use it appropriately.

The concept of the digital divide cannot be described merely in terms of connection or access but needs to incorporate the rift between those who use the technologies effectively and those who cannot (Barzilai-Nahon, 2006; Middleton, Veenhof & Leith, 2010; Selwyn, 2003, 2004; Sourbati, 2009). It can be understood as a question of quality of use and extent of digital engagement (Tsatsou, 2011). The broadband network is not just another telecommunication infrastructure but an ecosystem that includes networks, services, applications and users. Internet or broadband connectivity can be positioned within the broad informatization process of using communication technologies to further a country's development into an information society (Rogers, 2000). Policies that address ubiquitous access or provision of services are only one part of the whole process.

In terms of access to the technology, South Korea has largely been successful in closing the gap between urban and rural areas. However, the second-order effects of being able to skilfully use the technologies still have not been resolved (Moon, Hossain, Kang & Shin, 2012). According to the digital divide index, the gap between agricultural/fishery groups and the general population was the largest among various disadvantaged groups, especially in terms of quality of internet use (National Information Society Agency (NIA), 2012).

South Korea's Information Network Village (INVIL) program is an exemplary government policy that enables sustainable broadband adoption in rural areas. The program aims primarily to improve financial gains of the communities through broadband connectivity but it also has an important component of building sustainable communities. This paper examines how the INVIL program has led to sustainable broadband adoption in rural areas.

Closing the Gap in Rural Communities

Due to distance and low density, rural areas are usually not viable for private companies to invest in telecommunication infrastructures. However, the benefits of the investment in rural areas are greater as a whole compared with any other region. This obvious disparity between internal rate of return and external rate of return is usually the rationale for subsidising rural infrastructure (Parker, 2000). Laying the infrastructure may not generate immediate profits but it results in externalities such as consumer welfare and productivity.

Investing in infrastructure in rural areas usually has a positive economic impact (Katz & Suter, 2009). For example, a study found that providing small and medium sized enterprises (SMEs) with broadband increased internet adoption and usage by creating user demand through the workplace. In effect, it diffused the technology into the surrounding communities (Hollifield & Donnermeyer, 2003). Networks can also help businesses create value. Steinfeld, LaRose, Chew and Tong (2012) analysed 333 rural businesses and found that information and communication technology (ICT) adoption had enhanced the region's social capital by linking local businesses to form clusters. Atasoy (2013) examined the changes that occurred in the labour market and found that broadband availability raised employment more in rural areas compared with the urban counterpart. Broadband networks link isolated areas with the rest of the market, which can help farmers reach out to areas beyond their own locale. A study conducted in rural America found that wage and salary jobs, as well as the number of proprietors, grew faster in areas with broadband access. Furthermore, broadband is known to increase community engagement and enhance the provision of health and educational services (Stenberg, Morehart, Vogel, Cromartie, Breneman & Brown, 2009). Such empirical evidence supports the hypothesis that rural economies can benefit from broadband connectivity.

Nonetheless, digital divide policies in rural areas are not always successful due to the complex nature of rural development. Lack of community participation and engagement has been identified as one of the major impediments (Kumar, 2012). Sometimes, connectivity can help rural residents to find urban jobs online and can result in deprivation of human resources in rural areas. While this increases an individual's opportunity, it does not benefit the rural community as a whole (LaRose, Gregg, Strover, Straubhaar & Inagaki, 2008). Furthermore, information-related development projects in the agricultural sector often result in benefiting the information sector and not the farmers, which then results in an increased inequality (Flor, 1993).

Infrastructure is only a necessary and not a sufficient condition for rural growth (Malecki, 2003). Provision of connectivity must be followed by sustainable adoption. According to LaRose, Strover, Gregg and Straubhaar (2011), government subsidised broadband adoption programs do not assure an increase in broadband adoption. However, public education campaigns do stimulate broadband adoption beyond the infrastructure investments. This applies to rural residents in particular since they often lack the necessary skills to fully utilise digital technologies (Strover, 2001).

Information Network Villages (INVIL)

The INVIL project is an internationally recognised public policy program of South Korea that won first place in the 2011 United Nations Public Service Award in the category of 'Fostering participation in policymaking decisions through innovative mechanisms'. In 2001, the Ministry of Public Administration and Security (MOPAS, previously the Ministry of Security and Public Administration) launched the Information Network Village program with 21 INVILs across the country. The goal of the program was to narrow the gap between urban and rural areas "by increasing availability of e-government services and to increase income level of local residents by boosting regional economy through e-commerce, which eventually leads to the improvement of the quality of life in rural communities" (INVIL Central Agency, 2013, p. 11). By 2013, 361 INVILs were operating across in all of the nine provinces, funded by the central and provincial governments. The principle of the program is that anyone should have access to information regardless of occupation, age and location.

The uniqueness of the policy lies in its approach. First of all, it is a joint program that involves both the central and provincial governments. While the central government oversees the program nationally and provides the initial funding to set up the villages, the provincial government selects, manages, reviews and provides continuous support. This way, the villages are set up systematically while allowing each village to build upon its own strengths and needs in the long run. Second, instead of investing heavily in the infrastructure, the program emphasised the participants' actual benefits. By involving the provincial government in the selection and maintenance of the villages, local communities can fully benefit from the program. Third, it is not set up as a one-time grant but is an ongoing program. For example, in each village, full-time INVIL managers are employed to help the villages build their websites and keep the training programs running. This is to create user demand and adapt to changing local needs so that user-based innovative uses of broadband may be facilitated in the villages.

An evaluation of the INVIL program conducted in 52 villages in Gangwon-do suggests that there were significant economic gains. The revenues of the villages were 827.5 times higher in 2010 than in 2001 (Whang, 2012). The main factors contributing to revenue increase were the websites and knowledge sharing among community members (Jeong, Koo & Lee, 2010). While empirical evidence clearly shows the economic gains, there must be a more nuanced evaluation tool that includes not only financial benefits but also enhancement of communities and user skills. Eight evaluation items were proposed through an analysis of a survey of INVIL participants: information education, infrastructure, information use, participation of residents, autonomy of village, increase in income, village promotion and quality management (Whang, 2012).

The community has always been at the centre of the INVIL program. The commitment of local residents is a major component for the establishment of INVIL. Their participation is crucial to the maintenance of the program. Participation could be in the form of online engagement, training or other economic activities generated by the program (Kang, 2009).

Research Method

This study examined the outcome of the INVIL program against the policy framework adopting a case study approach. The INVIL program is an integrated policy that aims to narrow the digital divide by not only providing access to broadband but also sustainable outreach programs in the long term. The main policy goals were narrowing the digital divide between urban and rural areas, creating economic benefits, and building sustainable communities. We analysed the overall outcome of 361 INVIL programs and also conducted an exploratory case study of three successful villages: Mosan Onion Village, Baekmiri Village, and Gaemideul Village.

The data was collected using three different methods: public government documents, Information Village Network websites and interviewing the INVIL program co-ordinator at MOPAS as well as INVIL managers of Mosan, Baekmiri and Gaemideul Villages. Multiple sources of data were sought in order to validate the results and minimise any bias. In policy research the case study approach is especially relevant because of the complexity and unpredictability of the policy outcome (Liu, 2012).

The benefits of telecommunication services in rural areas are difficult to measure empirically. Policies that focus on increasing tele-density do not capture the social or economic impact (Ramirez & Richardson, 2005). In order to effectively assess the policies, Ramirez and Richardson (2005) propose four dimensions that are important in measuring the impact of telecommunications in rural communities: infrastructure, services and applications, awareness, and skills. Liu (2012) proposed an analytical framework to assess the effectiveness of agricultural ICT policies. The main components of the framework are to examine connectivity and content, each containing both supply and demand-side perspectives. The concepts used in the framework are infrastructure, affordability (sustainability), quality and knowledge. In this study, sustainable broadband adoption is used as a key concept in evaluating the outcome of the policy implementation. Emphasis is placed on the continuous funding for support, training and sustaining communities.

The impact of broadband is very difficult to ascertain because the technological deployment usually occurs concurrently with economic development, making it impossible to determine cause and effect. There is also the problem of spill-over externalities and effects that occur in the long run, which makes it hard to measure the tangible outcomes (International Telecommunication Union, 2012). A case study approach is adopted in order to qualitatively assess the program's effectiveness, not only in terms of tangible outcomes but also to possibly capture externalities. The following sections provide a descriptive analysis of the policy framework, assessment of the outcomes based on the framework and details of the case study.

Assessing the INVIL Program

As of June 2013, among the 394 INVILs that were established since 2001, 361 were actively operating. The majority, 247 villages (68%), were launched in the first five years of the program. This reflects the policy framework of first laying the infrastructure and then sustaining the uses. Except for four villages that are urban villages that aim to build local communities, most INVILs are designed to generate income, mostly from e-commerce and tourism (Whang, 2012). The cost of setting up one INVIL is approximately \$3 million. (Throughout this paper, 1,000 Korean Won (₩) converts to 1 Australian Dollar (\$) in all dollar figures.) In 2013, the central government budget for INVILs was \$5 million, of which 30% was allocated to salaries of INVIL managers. The central and provincial governments contribute to the

maintenance of the villages. While the proportion varies by area, the provincial governments are increasingly taking up a larger role.

Narrowing the Digital Divide

In each INVIL a village information centre is established at the onset of the program, where computer facilities are set up. Table 1 shows the increase in computer and internet use among village residents compared with other rural areas, indicating a reduction of the digital gap. In 2000, before the INVIL program was launched, the average computer penetration in the selected villages for the INVIL program was 37.3%, and internet usage 9.1%. In 2008, after the INVIL program was introduced, the average jumped to 72.1% and 66.5% respectively, which is higher than the national average agricultural/fishery statistics.

This increase was enhanced by various educational programs organised by the INVIL manager. In the early stages of INVIL most of the training programs focus on basic computer use but, once the village is established, setting up e-commerce sites, online marketing, system operation and online finance become more popular among village residents. In 2001, there were about 15,000 trainees in the program. This increased to 400,000 in 2012.

The central government trains all INVIL managers every year, so that they can provide customised support to local community members. For example, in 2012 MOPAS held more than 20 training sessions for INVIL managers in nine locations. The provincial government also runs their own re-training programs. As a result, most INVIL managers have the opportunity to get professional training at least twice a year.

	INVILs		Agricultural/fishery areas (2011)	National average (2011)
	(2000)	(2008)		
Computer penetration	37.3%	72.1%	60.8%	81.9%
Internet usage	9.1%	66.5%	38.9%	78.3%

Table 1 – Narrowing the access and usage gap (2011)
Sources: NIA (2012a, 2012b); INVIL Central Agency (2013)

Productivity and Profit Gains

As an effort to systematically enhance economic gains, MOPAS set up two central websites: one for selling local produce and the other for selling travel packages. They provide consulting services to rural farmers to help them develop new products, services and marketing tools. Revenue from the two online malls in 2006 was \$3 million, which increased to \$40 million in 2012. During the same period, the average revenue per village increased from \$11,000 to \$114,000. In 2012, there were 1.1 million INVIL online shopping mall visitors and 176,181 purchases were made through the site. INVIL travel package visitors reached 310,000 and 38,443 purchased travel packages from the site (Figure 1).

The INVIL online shopping mall has sold more than 11,000 different types of products to date. Most of them are locally produced agricultural products. The most popular products in 2012 were green apricot jelly (Jeonnam Gwangyang ‘Maehwa Village’), wild honey and apples (Miryang ‘Ice Valley Apple Village’; Yeongdeok ‘Peach Village’). While selling local produce to consumers in other areas can help local farmers in terms of revenue, the flow is outbound. In contrast, various tourist packages can bring travellers from other areas into the local community, which has externalities such as boosting local

businesses and building a sense of community among the members. There are 348 different INVIL travel packages ranging from farm-stay, weekend farming and bed-and-breakfast. Popular packages include ‘making cheese’ at Imshil Cheese Village, ‘trout catching’ at Jeongseon Baekdu Village and ‘clam digging’ at Hwaseong Baekmiri Village.

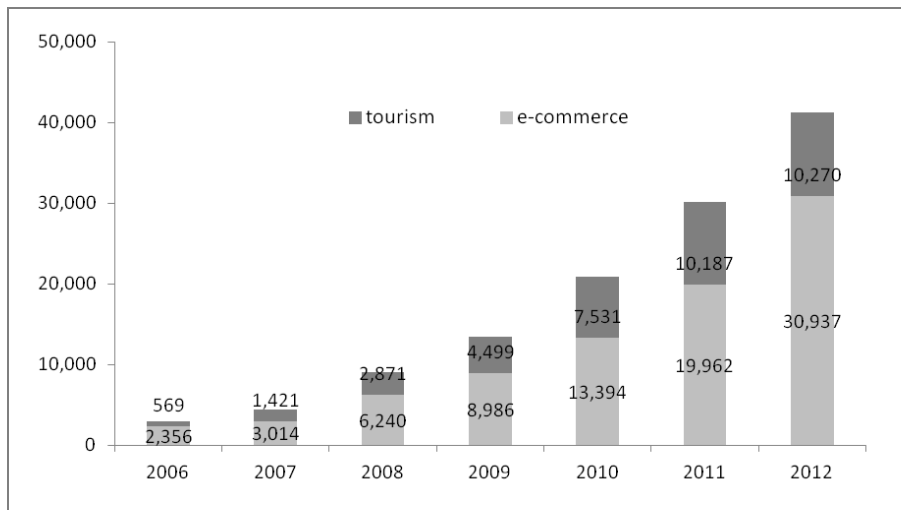


Figure 1 – Revenues from e-commerce and tourism (unit: AU\$1,000)
 Source: INVIL Central Agency (2013)

Building Sustainable Communities

In each INVIL, a committee consisting of approximately 15 local members oversees the programs and promotes activities to local community members. It is difficult to quantify the outcome of building sustainable communities. However, anecdotal evidence suggests that there is a variation in how INVILs can help sustain rural communities.

One example of how local communities utilised the internet to build communities is the development of a video conferencing program for marriage migrants. A video conferencing tool translated into seven different languages was set up to help immigrant women maintain links with relatives in their home countries and in other areas scattered around South Korea. Marriage migrants are on the rise in rural areas but, due to language barriers and lack of digital literacy, they are often marginalised in their communities. Digital literacy programs for marriage migrants in multiple languages are run in many of the INVILs to help marriage migrants learn the technology more effectively. Due to the online conferencing application and training, immigrant women are now able to communicate with their family around the world.

Another example is how INVILs can strengthen the connection between intergenerational urban and rural family and relatives. There is no doubt that there is an influx of city travellers to INVIL areas, which helps local businesses to thrive. Anecdotal evidence suggests that there are other subtle changes. Families who visit their extended families in rural areas extend their stay longer than before, knowing that INVIL centres can provide high quality internet access, equivalent to the facilities back in their city. They no longer think that the rural village is a remote and unfamiliar place. They come and stay comfortably for extended periods of time. The perceived distance between urban and rural areas has somewhat been narrowed.

The Case Study

Among the 361 villages, Mosan Onion Village, Baekmiri Village and Gaemideul Village were selected as the cases, each with a slightly different focus. In 2012, Mosan was the village with the highest e-commerce revenues, while Baekmiri generated the highest tourist package income. Gaemideul adopted a combined approach of having both e-commerce and tourism components in their program, and has been awarded the best village prize for three years in a row by the government. The purpose of this case study is to assess the program using both qualitative and quantitative measures (Table 2).

Mosan Onion Village

Mosan started the INVIL program in 2003 and launched their e-commerce site in 2006. As of 2013, 43% of households participate in selling their products online. The main products they sell online are onion extract and peeled garlic, both very popular products in South Korea. This generated an average of \$4,700 extra revenue a year per household participating in the INVIL program. Each year, around 400-500 consumers of the online products visit the village to participate in harvesting the original produce. The economic growth was followed by active participation of the village residents. INVIL households convene once a month to discuss any management issues of the program. Among INVIL participants 74% are over the age of 60, which is a similar trend in most agricultural villages. In this particular community, this coupled with the fact that the village participated in the INVIL program early on (in 2003) makes sustainability a problem. Computers at home have not been replaced since then and internet usage has not improved. Nonetheless, having regular visitors from outside the village has enabled a more vibrant and lively village atmosphere.

Baekmiri Village

Baekmiri is a fishery village nominated as an INVIL in 2008, where 54% of the households participate in the program. The participants have a high PC penetration rate (over 90%) and high internet usage rate (over 90%). The types of tourism packages they have developed are mainly clam/crab catching. Since 2009, the average annual revenue increase has been 176%. 150,000 tourists visited this village in 2012, most of them from the Seoul metropolitan area. In addition to direct revenues incurred by tourist package programs, indirect revenues resulting from tourists' spending on local produce amount to approximately \$7.8 million per year. The tourist package is seasonal, running from May to November, freeing the other months for ICT training. During the non-tourist season, INVIL participants received an average of 5.7 ICT trainings per year. The new business model of drawing tourists to the village where participants are required to take part, as well as the frequent interaction through training sessions, have provided the village residents with a sense of community.

Gaemideul Village

Gaemideul is a typical farm village, the main produce being organic chilli peppers and bonnet bellflowers, both very popular Korean vegetables. About one-third – 36% – of the households participate in the INVIL program and are very active in getting regular ICT training. On average, INVIL participants attend about 70 training sessions per year, which is a very high figure compared to other villages. The main products they sell online are peppers and corn. Their tourist packages include trout fishing, making rice cakes and bicycle hiking, which were carefully designed to attract urban residents. Revenues increased by 103% per year after the launch of the program. While there has been some tension between INVIL and non-INVIL households as well as complaints about noise and litter generated by tourists, the overall evaluation of the village residents is positive. The village's association had three aims for the community: restoring the community, enhancing the sense of pride and increasing income. As an INVIL recipient in 2009, they have been largely successful in realising these goals.

Name of village		Mosan Onion	Baekmiri	Gaemideul
Business model		E-commerce	Tourism	Combined
INVIL launch year		2003	2008	2009
Number of households (population)		220 (350)	130 (370)	39 (88)
Percentage of households participating		43%	54%	36%
Informatization	Computer penetration (%)	50%	More than 90%	90%
	Internet usage (%)	50%	More than 90%	70%
	Average ICT training frequency per INVIL participant per year	5.5	4.7	68
Economic gains	Average annual income generated by INVIL per household (2012)	AU\$4,700	AU\$54,300	AU\$39,200
	Average increase in income per year since the start of INVIL	66%	176%	103%
Sustaining communities	Number of website visitors in 2012	34,000	35,000	51,000
	Number of tourist program participants in 2012	400	150,000	28,000
	Changes in the village after INVIL	Increase of visitors from other areas and active participation in communal activities	Formerly marginalised residents now have a new source of income and are actively participating in communal activities	Regular gatherings at ICT training sessions enabled members to discuss community issues with each other more frequently

Table 2 – Summary of outcomes in the three villages

Conclusion

The success of the INVIL program can be ascribed to its unique approach in building sustainable broadband adoption. First of all, the INVIL program can be differentiated from any other government intervention programs that address the digital divide in rural areas in South Korea. Unlike previous programs, such as the Ministry of Agriculture, Food and Rural Affairs' 'Digital Lounge' program or Rural Development Administration's e-commerce grant that limited the funding to 1-2 years, INVIL provides systematic support after setting up the infrastructure. This emphasis on continuity and not on infrastructure is one of the reasons why INVILs are sustainable. Second, most projects developed under the INVIL program have an inbound strategy that brings people into the villages, if not in person, through their website. All INVILs share the ultimate goal of building communities. It is not merely adding a layer of information technology to existing villages but a constant effort to enhance the sense of community by utilising the INVIL centres as a central location within the village. INVIL members actively participate in the projects. This is facilitated by each INVIL's manager who is hired not only to operate the centre but is given a significant role of monitoring, educating and connecting people within the community.

The digital divide is not simply a binary divide between ICT haves and have-nots. Rather it should be understood as varied degrees of multiple layers of digital disadvantage. While the INVIL program is

largely a successful policy due to its sustainable nature, there are still issues surrounding the rural and urban digital divide that must be addressed. First of all, a second-level digital divide may be occurring at various levels. Even in INVIL areas, the urban-rural divide has not completely disappeared. While the recipients have benefited greatly from the government support, the development of broadband technologies in urban areas is not static, meaning that they would also have experienced growth. Thus programs such as INVIL need continuous re-evaluation and re-design, in order to fully embrace the developing technologies. Second, another possible area of the second-level digital divide is that there may be a rift within the community between those who participate in the INVIL program and those who do not. Policies implemented to bridge the digital divide usually have an ultimate goal of benefiting all individuals. INVIL programs are effective in enhancing communities as a whole but there may be individuals who are not fully part of the picture. Currently there are no statistics to support this argument, which needs further attention in future research. The third area where the second-level digital divide may occur is that there may be a widening gap between rural areas across the nation. There are some areas with largely successful INVILs and there are areas with not-so-successful INVILs. Furthermore, there are non-INVIL areas where there is no ongoing support. This, again, is not supported by empirical evidence and needs further investigation.

This study examined the overall outcome of the INVIL program with the emphasis on the policy framework of narrowing the digital divide, increasing economic gains and sustaining communities. Three exemplary cases were examined to provide an in-depth account of how INVILs can help sustain rural communities. The analyses show that efforts to bridge the digital gap can be successful by identifying local communities' needs and providing continuity in support. Further comparative analysis of villages that have been successful and those that have not may shed light on the common elements of sustainable broadband adoption in rural areas.

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