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Computers and the Internet in Rural Areas: The Case of Hwangdun *E-village**

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농촌지역의 컴퓨터와 인터넷 보급: 강원도 황둔 정보화마을의 사례*

허 우 긍**

Abstract : Hwangdun is a remote rural village in Korea, located in the montane central part of the nation. In the early of 2000, the provincial government of Kangwon-do designated Hwangdun as a model *E-village*. The village was connected to the national information backbone network, and 100 personal computers and 66 Internet TVs were distributed among the villagers for free of charge. The village center too was turned to a 'tele-cottage,' harnessed with PCs, a kiosk and peripheral devices. The Hwangdun *E-village*, being the first case of its kind in Korea, has drawn much attention nationwide, and has triggered similar informatization investments in a number of rural areas. The present study conducted a survey in the early of 2001 to examine what the *E-village* Project has meant for the people in Hwangdun. In particular, the survey focused on the characteristics of the households having computers and of the computer users, the ways in which people use their computers, the kinds of problems and difficulties the users have faced, and the changes of Hwangdun after the introduction of computers to the village. This paper describes the major findings of the study and discusses the research and policy implications of those findings.

Key Words : the Internet, computer, changes of rural areas, informatization, digital divide, *e-village*

요약 : 강원도 원주시 황둔 마을은 2000년 강원도의 농촌정보화 시범마을로 지정된 곳으로, 마을에 고속통신망이 놓이고 100가구에 컴퓨터가 그리고 66가구에는 인터넷 텔레비전이 보급되었으며, 또한 마을 행정실을 컴퓨터와 주변기기를 갖춘 정보센터로 꾸미게 되었다. 황둔의 정보화사업은 전례가 없던 일로 곧 전국적인 관심을 불러일으켰고, 전국 농촌 여러 곳에서 엇비슷한 정보화 시범 사업이 펼쳐지는 계기가 되었다. 본 연구는 황둔 정보화마을의 이러한 전위적 위치에 주목하여, 2001년초에 현지 조사하고 정보화마을 사업이 황둔 마을과 그 주민들에게 어떤 의미를 가지는 것인지를 밝히려고 노력하였다. 특히 컴퓨터와 인터넷 텔레비전 보급가구 및 이용자의 특성, 컴퓨터의 이용 빈도와 내용 및 문제점, 컴퓨터 도입 이후의 마을 변화 등을 중점 조사하였다. 이 글은 이러한 연구의 결과를 설명하고, 학술적 정책적 시사점을 토론하였다.

주요어 : 인터넷, 컴퓨터, 농촌의 변화, 정보화, 정보 격차

1. Introduction

Telecommunication investments are perceived as strategic tools for economic development of rural areas (for instance, Cronin, *et al.*, 1995; Hottes, 1994; Ramirez, 2001, 316; Strover, 2001). With the arrival of the Internet in recent years, access to this new, advanced tool has assumed huge importance.

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The adoption and use of advanced telecommunications technologies in rural and remote areas, however, is severely limited both by a lack of access to the network, partly as a direct result of their sparse population, and by a low rate of possessing personal computers. The very areas that are supposed to gain the most from telecommunications are the last ones to be served in reality. Without adequate connections to advanced telecommunications infrastructure and services, rural communities may not be able to fully participate in the emerging information economy (Lentz & Oden, 2001; Schement & Scott, 2000).

It is no secret that rural areas of Korea are lagged far behind than urban places in every aspect of life. The case of advanced information technology is not an exception. Rural areas suffer from poor access to information infrastructure, in that most of rural Korea is not covered yet with the national information superhighway.[1] There are not many rural households possessing personal computers (PCs) too, and the computer literacy of rural people is far behind their urban counterparts for that matter (Lee, 1998).

It has been more than a decade since the central and local governments and public agencies in Korea have paid attention to the digital divide between urban and rural areas (Lee, 1997). Efforts have been made to bridge the divide, including programs of computer classes for rural residents. The 'Rural computer school' is one of such government-driven programs of rural informatization. The rural computer school, since its inauguration in 1988, has been an effective machine teaching rural residents computer skills systematically. The computer schools are now run on a permanent-base by post offices in rural counties. Detailed studies of the rural computer schools can be found in Huh (1999a, 1999b). Efforts were also made to distribute computers for some of the school children of lower income households in rural areas. The program distributing free PCs was, however, much smaller in scale than the offerings of rural computer schools.

The efforts are in the second phase since around the end of 1990s. Budgets have been raised for the expansion of information infrastructure to rural areas, and a variety of computer workshops educating rural people. A unique case of such efforts is the Hwangdun *'E-village'* Project, which this paper intends to examine.

Hwangdun is a remote rural area in Korea. In the early of year 2000, the provincial government of Kangwon-do designated Hwangdun as a model *E-village*. The village was connected to the national information backbone network, and 100 personal computers were lent among the villagers for free of charge. The community center too was turned to a 'tele-cottage,' harnessed with computers, peripheral devices, and the like. The Hwangdun *E-village*, being the first case of its kind in Korea, has drawn much attention nationwide: even the President Kim Dae-jung had a tele-conference with the Hwangdun residents in February of 2001; and the project has triggered similar informatization investments in a number of rural villages throughout the country.[2] It appears to be worthwhile to investigate the *E-village* Project in detail, being an antecedent of rural informatization programs.

The present study conducted a survey in January through March of 2001 to examine what the *E-village* Project has meant for the people in Hwangdun, and what implications we can draw upon for developing the future programs of rural informatization. It is hoped that the findings of the present study make contributions research-wise as well. While the previous studies have put forward quite a number of general ideas and speculative statements on the meanings of information technology in rural Korea (for instance, the Information Culture Center of Korea, 1998; Kim, 2001), what we are still lack of are the empirical studies on the subject either to support or disapprove those ideas and speculations.

2. The Hwangdun-Songgye Area and People

1) The setting

Hwangdun is located in the montane central part of the nation. The area is about 34 kilometers southeast of Wonju, the central city of the region. Hwangdun was quite isolated until recently when a national highway passing nearby was completed in 1995 and the local roads were renovated to connect the area with the highway thereafter.

The area of Hwangdun includes several subdivisions: Hwangdun 1-ri and 2-ri, and Songgye 1-ri and 2-ri. For convenience, these administrative subdivisions will be called Hwangdun collectively in this paper. Hwangdun 1-ri and Songgye 1-ri are the central part of the area, whereas Hwangdun 2-ri and Songgye 2-ri are in the periphery. There are a small number of public services in the central part of the village, including an administration office (what is now called 'Community Information Center'), an elementary school and a middle school, a co-op office and store, a public health clinic, and a post office.

Rice is the dominant product of the area, and vegetables the secondary. The Chiaksan National Park is nearby, so that a number of restaurants, gas stations, and small stores are established along the major roads of the area.

2) The people

Hwangdun has 398 households and 1,122 people registered as of 2000, according to the census taken on November 2000.[3] The present study, however, was able to identify only 322 households and 827 persons living in the area at the time when the survey was conducted in the early 2001. Except several households that the survey crews were unable to interview, these 322 households are believed to be the maximum number of households the survey

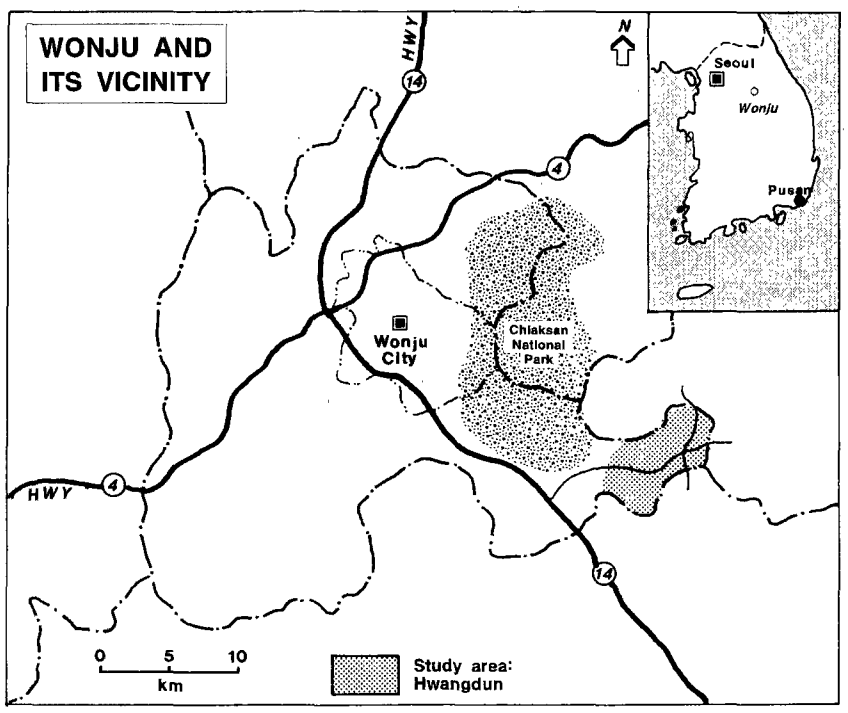

Figure 1. The study area

Table 1. The Number of Households and Residents in Hwangdun

	Hwangdun 1-ri	Hwangdun 2-ri	Songgye 1-ri	Songgye 2-ri	Total
Survey counts (Feb. 2001)					
Households	124	84	61	53	322
Persons	316	212	177	122	827
(male)	(50.6%)	(52.8%)	(49.7%)	(50.0%)	(50.9%)
(female)	(49.4%)	(47.2%)	(50.3%)	(50.0%)	(49.1%)
Census counts (Nov. 2000)					
Households	159	96	67	76	398
Persons	445	265	210	202	1,122

was able to count. The discrepancy between the census counts of households and the counts of present study indicates that a fair number of people are living outside of the area while maintaining their registration in their home village.

The age and gender distribution of the villagers is more or less similar to that of the average rural villages in Korea, reflecting the decades-long trend of out-migration. Like elsewhere in rural Korea, Hwangdun has lost its population for the past several decades. The out-migration flow of the area, however, appears to be tapering off somewhat in recent years, partly because there are not many potential out-migrants left any more in the area, and because there has begun an inflow of people such as retirees from urban areas (in a small scale though).

The population pyramid of the village shows that the age groups of twenties and thirties are the smallest among other age cohorts, and the kids younger than 10 are also among the smallest due to the small number of their parent age groups. The numbers then increase, as the age gets older, reaching the largest in the sixties.

While the sizes of households vary from 8-member to single-member families, the average size of families, 2.6 members per household, is smaller than the national average of 3.4 members per household. Nearly a half (47%) of the entire households are two-person families. Single-person families also account for 16% of the total households, most of them being

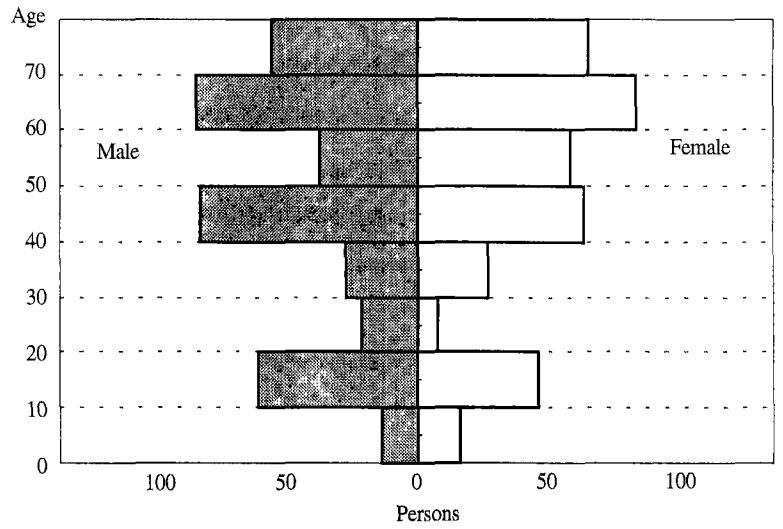

Figure 2. The Age and Gender Distribution of Hwangdun Residents(827 persons in total)

older than 60.

We categorized the Hwangdun households in terms of whether there were school pupils and college students in the families, in order to see how many potential users of computers there were in the village. It is needless to say that professionals and office workers among adults and pupils and students in younger ages are the major customers of computers. Since there were not many white-collar workers or college students in Hwangdun, we suspected young school children were the main users of computer in the village. The analysis found that only a quarter of the households had pupils and students, whereas the remaining three quarters were adult-only families. These figures imply that the adoption of computer in this community can be slow and limited to some extent.

Hwangdun is a typical rural area, in that 60% of villagers are involved in farming and/or raising domestic animals. Only 9% of the people are employed in non-farming occupations such as office, service and sales, and manual labor. The remaining 30% of the villagers are either school pupils (18%) or unemployed (13%). The residents in the village center (i.e., Hwangdun 1-ri and Songgye 1-ri) have slightly more non-farming occupations than those in the peripheries, but the center-periphery difference in occupation is only marginal.

3. The *E-village* Project of Hwangdun

1) The *E-village* Project

The introduction of computers and the Internet into Hwangdun was initiated by the Kangwon-do Province and Wonju City, the major diffusion agencies in this case. In the late 1999, the provincial and city governments designated Hwangdun as a 'Model *E-village*.' The selection of Hwangdun among other eligible areas was made based upon that Hwangdun was near the Wonju-Yongwol line of the national information backbone network, so that there was no need for extra investments of extending the network to Hwangdun, and that a survey was conducted to find that Hwangdun residents had more number of potential users of computer than the other villages of the Wonju region. The village leaders of Hwangdun also took a part of the decision making process. The leaders organized a task force to induce the project investments to their village in the earlier stage of the process. The task force was formalized later as a self-governing body of the project, namely the village informatization steering committee.

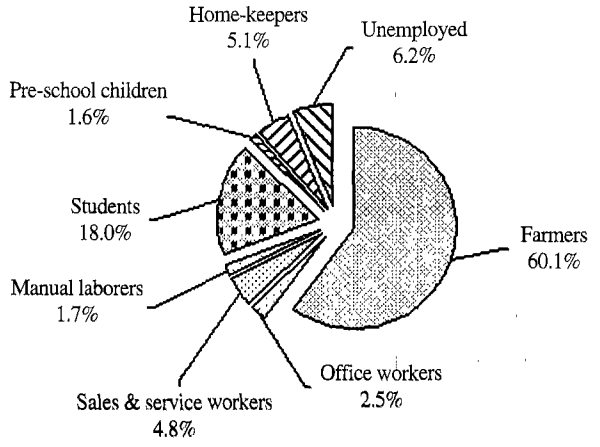

Figure 3. Occupations of the Hwangdun Residents (827 persons in total)

A number of private companies too were involved in this *E-village* Project: the Korea Telecom or 'KT' in brief, the biggest telecommunication provider of the country, was in charge of building the local area computer network (LAN) for the village[4]; Sambo Computer or 'TriGem Computer', one of the major computer makers in Korea, donated 110 sets of personal computers and peripheral devices; Samsung SDS, a subsidiary of Samsung, took the responsibility to supply software and teach the people of Hwangdun how to use computer; and the central and local governments provided with the money for the project. It is said that the price tag of the project was a little over 1.3 billion Korean wons (i.e., equivalent to one million U.S. dollars).

The Kangwon-do provincial government distributed 100 personal computers for free among the village households the spring of 2000. The government leased each of the 100 households a personal computer (PC), a small video camera attached to PC, and a computer table and a chair. PCs were given to those households in the vicinity of the village center where the high-speed LAN was installed. A prior survey was conducted as well to determine the eligibility of the free PCs: that is to find out whether there were potential users in a household, and whether the households desired to have PCs.

The community administration office was refurbished to a tele-cottage, called 'Hwangdun-Songgye Community Information Center,' harnessed with 8 sets of personal computer, a kiosk for administrative communications between the village and Wonju City Hall, audio-video devices, and furniture. Anyone in Hwangdun can come to the Center to use the facility there. The Center is normally full of middle-school kids playing around the computers after the school hours. The Community Information Center also offered computer classes for the residents intermittently during the one-year period from April 2000 to March 2001.

As time went along, requests were made by the residents in the periphery which were not connected with the LAN and therefore not eligible for the free personal computers. Later in the end of 2000, the local government decided to lease namely 'Internet televisions' among 66 households in the peripheral area. The Internet television (TV) uses a TV set as an Internet monitor. Each of the 66 households was given a converter (or a 'set-top box' which functions like a CPU of computer), a video camera, and a modem to connect TV with the ordinary telephone line. And a 4-day workshop was offered to the grantees of Internet TV to teach how to operate the machine. Four additional sets of Internet TV were installed in the Community Information Center and schools.

An Internet TV costs much less than a PC, so that the government authority believed the TV could be a reasonable alternative to the expensive PC. It turned out, however, that the Internet TV had a number of drawbacks. It is rather cumbersome to manipulate the machine to be 'on-line,' taking more steps than the LAN-connected PC does. The speed of interaction is slow too, since the Internet TV is hooked up with the ordinary telephone line. Most of all, people do not bother using their TV monitor as an equipment sending an e-mail or surfing the Internet. Instead, they use the TV in the time-honored fashion, i.e., to watch the ordinary TV programs. The project of free Internet TVs appears to be a failure, reaching far behind its ambitious goal.

In brief, the *E-village* Project of Hwangdun can be taken as a support for 'the market and infrastructure perspective' of innovation diffusion studies (Brown, 1981), which emphasizes the role of diffusion agencies.[5] The strategy and activities of the diffusion agencies are of the utmost importance, and the ability and intention of individuals adopting innovation assume only a secondary role in the diffusion of computers. The Hwangdun case clearly shows that the diffusion agency, that is, the local governments determined first where the investments should be placed and who would be the primary target of their diffusion programs. A recent study on the rural

informatization program in Korea (Choo, 2001) confirmed too the key roles played by the central and local governments in the decision-making process of the program.

The Wonju City, together with the village informatization steering committee, even nowadays administers the project businesses such as maintaining the web sites of the Hwangdun *E-village*, running the Village Information Center, reallocating computers and Internet TV sets in the occasions when the hardware were returned by former recipients, and the like.

2) Computers and Internet Televisions

The entire households of Hwangdun can be divided into three groups: 145 families with PC (accounting for 45% of the total households), 37 families with Internet TV (12%), and the remaining 140 households (44%) with neither PC nor Internet TV.

The 145 families with PC can be subdivided further, based upon whether their PCs were given by the government or purchased by the families on their own. There are 91 families with free PC (accounting for 28% of the total households), 24 with purchased PC (8%), 7 with both free PC and purchased PC (2%), and 23 with both free Internet TV

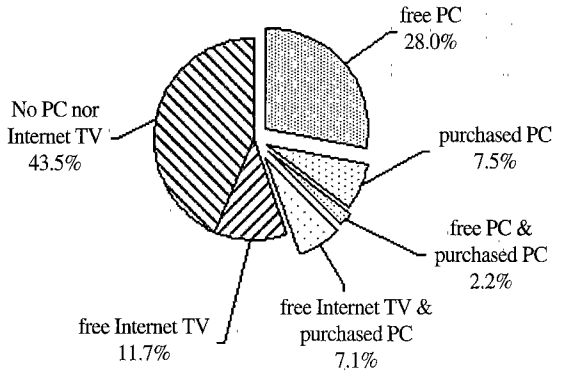

Figure 4. Proportion of Households with/without PC and Internet TV(322 households in total)

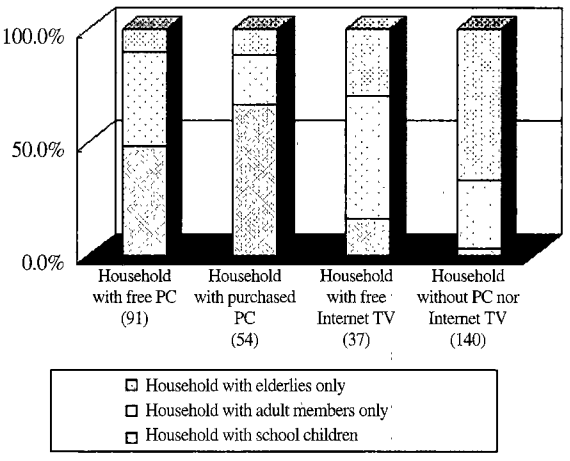

Figure 5. The Family Composition of Households with/without PC and Internet TV(The figures in the parentheses are the number of households.)

and purchased PC (7%). The latter three sub-groups of families are common in that they all have PCs purchased on their own, and can be aggregated into one group under the heading of 'the households with purchased PCs.'

These groups of households were examined in terms of the household head's occupation, age, etc. to find that they were differentiated most significantly by the criterion whether a household has a school child(ren) or not. Ninety percent of those households with school children have either free PC or purchased PC, while only less than 10 percent of the elderly (that is, the age of 60 or older) households have PC in their homes. These figures clearly show the school children are the major customers of PCs. An earlier study by the author (1994) also found that the usage of computer in rural Korea was dominated by younger ages.

4. Using Computers

1) Frequency of computer use

The survey asked the respondents how often they used their computers for what purposes. The analysis on the survey responses reveals that 60% out of 827 residents did not use the machine at all. The remaining 40% of residents used PCs either occasionally (7%; to use PC once a week or less), often (9%; two to four times a week), or daily (24%).

There is a remarkable difference in the frequency of computer use among the households with PC, the households with Internet TV, and those with neither PC nor TV. In the households with PC, 2/3 of the family members used computers at least occasionally, whereas 98% of the members of the households with no PC did not use computer at all. The households with Internet TV were rather similar to the households without PC in that 3/4 of the household members did not make their TV 'on-line' at all, indicating again that the Internet TVs were rarely used as a surrogate of computer. As explained earlier, it is a bit cumbersome to operate an Internet TV set. The little use of Internet TV thus implies that the operational simplicity can be a key factor of adopting new hardware.

In the households with PC, their family members appear to use computers quite often: that is, 40% of the members used PC daily and 11-14% of the members several times a week. Such a relatively frequent use of computers seems to due, at least in part, to the fact that the people were mostly beginners in computer and that there were computer courses in

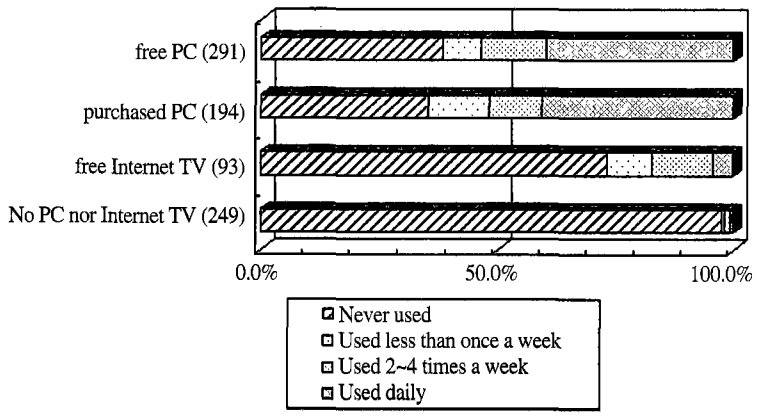

Figure 6. The Frequency of Computer Use(The figures in the parentheses are the number of persons for each of household groups.)

progress at the time when the survey was conducted. The curiosity and the need to practice what they learned in the class appear to result in such a high frequency of PC use at home. There was not much difference between the PC-granted households and the PC-purchased households in the patterns of computer use frequency.

2) The purposes of computer use

What did the Hwangdun people do with their computers and Internet TV? The survey reveals that they used their computers for web-surfing most (about 43.5% of 322 households)[6], then for gaming (34.2%), email (28.6%) and business such as word processing (24.5%). Only 13.4% of the households responded that they did have their family home-pages and used them. The Samsung SDS and Community Information Center helped them to make a homepage for each of the pc-granted households. The reason why the level of using homepages turned out to be such low might have something to do with the fact that most of the villagers were just beginners in computer and still needed more skills handling their home-pages. In addition, there were only several homepages of local business products such as craftworks and steamed buns, posted on the village portal site at the time when the survey was conducted in the early of 2001. The study also found few occasions of using the homepage of 'Wonju Daybreak Market' which is an early-bird agro-market open daily in the central city Wonju, because it was winter and there were not much agricultural items to sell in the flee market.

The purposes of computer use were examined further to find that the households with PC show much higher proportions of computer use than the households with Internet TV and those without PC across all the purposes of web-surfing, gaming, email, business, and homepages. It is interesting to find that the households with free PC show much higher proportion of using the Internet than those households with purchased PC, while the former has much lower proportion of using computers for the purpose of business than the latter group. Such distinction appears partly due to that the subjects taught in the computer classes of the Community Information Center were rather Internet-oriented and did not cover business use much. Farmers generally do not often encounter the needs to use word processor or spread sheet programs as well.

The households with Internet TV again show minimal use of their TV for the Internet, games, or business. One can consider, however, that such minimal levels of computer usage are even higher than

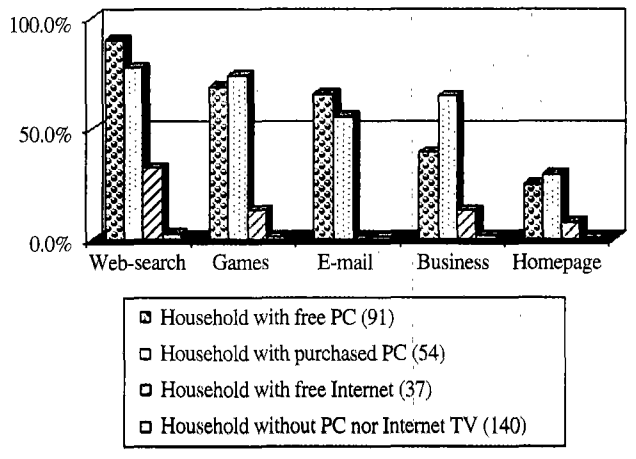

Figure 7. The Purposes of Computer Use(The figures in the parentheses are the number of households.)

expected. Given the fact that the operation of Internet TV is cumbersome and slow in response, those small percentage figures might reflect that people were practicing a little bit what they learned in the Internet TV workshop offered by the Community Information Center.

3) The gender and age difference in computer use

Since we found that the households without computer showed virtually no use of computer, we now focus on the households with PC (altogether 145 households) and examine their computer use in more detail.

The analysis revealed that the use frequencies differed considerably among the age and gender cohorts of the users. The use frequency was the highest in the teenagers, in that 97% of them used PC to some extent. The frequency then decreased, as the age gets older. It tells us again that the major customers of PC are the sons and daughters of their school age, while the elderly are largely indifferent even if they have access to PC. More than half of 50s and 60s of their age did not use PC, and only one third of them used PC several times a week or daily. Most of the age of 70 or older did not use the machine at all.

Males show higher frequencies of PC use than the

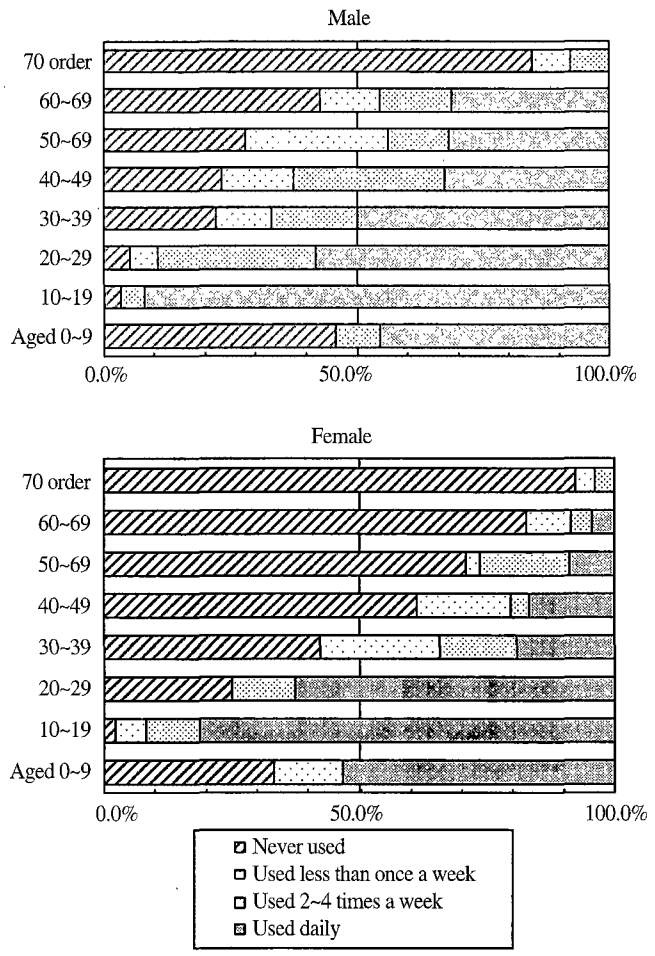

Figure 8. The Age and Gender Difference of Computer Use

female counterparts. While no gender gap is seen among the teenagers, males aged 20s and 30s use PC more than females of the same age, and then the gender gap reaches the largest among 40s, 50s, and 60s. The gender difference decreases again to a minimal level in 70s and older because most of them do not use PC anyway.

It is remarkable that women of 30s show significantly lower frequency of computer use than their male counter-cohort. The 30s completed their education prior to the time when a computer era emerged in Korea. The males of 30s, however, are in general forced to use computer in their work places, while the females of the same age are largely home keepers and have no such motivation to learn computer at home.

4) Problems in learning and using computer

The Community Information Center opened computer classes several rounds during the one-year period beginning from spring 2000. Anyone in the village, and the PC recipients in particular, were eligible for the free computer classes. Instructors of the computer classes were dispatched from Samsung SDS. The subjects covered in the classes were such as handling email, web surfing, using the bulletin board of the village homepage, updating one's own homepage, making video-phone calls and internet phone calls, and accessing the web site of the Wonju Daybreak Market.

The survey asked the respondents what was difficult most while they were learning how to use computer. The respondents pointed out English most difficult (41.2% of 119 responses), then handling the keyboard and/or mouse (34.5%). Others mentioned that the class materials were not easy to follow (12.6%), and that there were time conflicts often between the class hours and their daily working hours in farming season (9.2%).

These responses reflect clearly the life style of middle- and old-aged rural people. Korean farmers (and Hwangdun people for that matter) have never encountered with a need to know a foreign language like English until they are forced to facing with computer. It must be frustrating for them to use a language they did not learn how to read, even if there are only a handful number of computer commands and alphabets in English one needs to know. Handling a keyboard or mouse likewise is not an easy task to accomplish for a middle-aged or older farmer and home keeper. The responses listed above are of useful for developing the future programs of enhancing computer literacy of rural residents. It appears to be desirable as well to open computer classes during the farmer's slack season in order to attract more enrollees of the classes.

When the survey crew asked the Hwangdun people about their comments on the *E-village* Project as well as other urgent needs for a further adoption of computer, the majority of their responses were related with the infrastructure expansion and institutional improvements. The respondents pointed out that the local area network (LAN) must be expanded to

Table 2. Problems Encountered while Attending the Computer Class

Problems	Responses	Proportion
Need to know English alphabets and commands	49	41.2%
Handling the keyboard and mouse	41	34.5%
Understanding the subject matters	15	12.6%
Time conflict	11	9.2%
Other problems	3	2.5%
Total	119	100%

* Multiple responses allowed.

cover the entire village (27.5%), and that the quality of current telephone networking was rather poor (6.3%). In particular, Table 3 shows that an absolute majority (93.3%) of the households with no PCs pointed out expanding the network to the entire community utmost important. Such responses were maid mainly by the residents of Hwangdun 2-ri and Songgye 2-ri where the LAN did not reached yet. The responses highlight the network accessibility critical for the diffusion of computers in rural areas.

Many others were concerned about the burden of subscription fees and other charges of information use (22.8%). The subscribers of LAN were supposed to pay the monthly fee in full beginning from the summer of 2001, once one-year grace period waving a half of the fee was over by then. Some types of subsidy or special low rate fee like the 'E-rate' of the United States appear to be necessary for low-income families in the community. Korea Telecom, the provider of the network service for the village, however, has no immediate plan extending the grace period. The subscription fee can be an obstacle against a wider adoption of the Internet in this community in the near future.

Some others mentioned that they were not confident with what they learned in the computer classes at the Community Information Center and wanted to have more computer classes (28.0%). These four categories of answers mentioned above altogether account for 84.5% of total responses.

5. Conclusions

The basic telephone service had reached a very high penetration level even in remote rural areas of Korea. There is, however, a significant spatial unevenness in the access to more advanced communication technologies such as the Internet. As the wire-line telephone service did the same in the earlier years in Korea, these new Internet and other online services came to urban areas first, only reaching rural areas with a considerable lag. There has been a growing concern in Korea that, without adequate access to the advanced telecommunications infrastructure and services, rural communities may not be able to fully exploit the merits of the emerging information economy.

This paper examined the Hwangdun *E-village* Project, a recent government-initiated project of distributing personal computers in a remote rural community Hwangdun, establishing a tele-cottage in the village center, and educating the villagers. The present paper reported the findings of a survey on the Hwangdun area during the early of 2001.

The study findings indicate *the market and infrastructure perspective* of diffusion studies can be useful for a better understanding of the diffusion process of

Table 3. Opinions on the *E-village* Project

Opinion	HH with free PC	HH with purchased PC	HH with TV	HH with no PC nor TV	Total
Extending LAN to the entire community	2.7%	29.3%	17.9%	93.3%	27.5% (52)
Need more computer classes	39.7%	27.6%	21.4%	6.7%	28.0% (53)
Expensive subscription fee	35.6%	19.0%	21.4%	0.0%	22.8% (43)
Poor quality of the network	4.1%	13.8%	3.6%	0.0%	6.3% (12)
Need more administrative supports	4.1%	3.4%	7.1%	0.0%	3.7% (7)
Not want to have PC/TV any more	4.1%	0.0%	7.1%	0.0%	2.6% (5)
Other responses	9.6%	6.9%	21.4%	0.0%	9.0% (17)
Total	100%(73)	100%(58)	100%(28)	100%(30)	100%(189)

Note: The figures in the parentheses are the number of households.

information technology in rural areas. The study observed that the government authorities played the key role in the diffusion of PCs in the Hwangdun area; a typical top-down process of decision-making. The findings imply that the future research be focused more on the strategies of diffusion agencies as well as the roles played by key persons such as the elders of rural villages.

The study findings suggest further that, in the demand side of computer diffusion, the generation or age is a key variable in explaining the adoption behavior of rural residents. There are not many young-bloods around in Hwangdun (and elsewhere in rural Korea). It is more than likely therefore that the rate of PC adoption will be low, unless the diffusion strategy is redesigned specifically for the rural areas where the majority of population is upper middle-aged and elderly. The lack of PC use of middle-aged females in comparison to their male counterparts was another salient finding of this study. Such a gender gap indicates a need of study on the computer adoption behavior of the middle-aged women, as well as a need for developing computer education programs specifically designed for this target group of women.

A cheaper subscription fee is found to be critical as well for a wider adoption of on-line services in rural areas. The service providers including Korea Telecom do not have plans of differential user fees for rural areas at this moment. It appears to be necessary to develop subsidy programs soon for the users in rural areas, such as the 'E-rate' of on-line services in the United States.

It is still too early to identify tangible consequences of the *E-village* Project. It has been only a year or so since the project was implemented in year 2000. The seeds of change brought into Hwangdun by the project are yet to sprout and flourish in the coming years.

There are, however, some hints of changes. Several villagers began to use their web-pages in advertising and selling their farm or home-made products. The application of PC and the Internet to other areas than businesses, however, is more prominent. A fair number of people are now able to correspond emails and make Internet phone calls with their family members and friends, to search information on the web, or to word process and print leaflets and the like. The curriculum taught at the computer classes of the Community Information Center appear to be user-oriented enough to enhance the computer literacy of Hwangdun people. The daily lives of the villagers seem to have been changed in a number of ways too: for instance, some indulged into gaming on computer, and a few even paid attention to the on-line service of stock market information. We failed, however, to find spin-offs of possessing PCs. There were not many PC recipients in Hwangdun who purchased peripheral devices, software, or computer manuals on their own after the computers were given to them. The only exception was that a half of the households with PC bought printers under a joint purchase contract.

The nation-wide publicity of Hwangdun appears to be the single most important force of changes. The publicity has forced the shy, conservative villagers to be more open to the outside of their realm. The nation-wide attention has pushed the reluctant villagers attending the computer classes and practicing in their homes.[7]

Not every one in the Hwangdun community, however, was enthusiastic about computer. Some did use PC while others turned their faces away from it. A negative consequence of introducing computers to the rural area would be a social cleavage within the community, a divide between IT sympathetic and IT indifferent groups. The more a PC-prone villager secludes in his/her own room playing with PC, the more isolating him/herself from the rest of community members. Such a division within a rural community, which otherwise used to be homogenous in their ways of social interaction and killing times, can be problematic in the future.

Notes

1) The basic telephone service, however, is ubiquitous now in Korea. The service has reached into rural and remote areas in Korea, and is available now even in the most isolated rural communities.
2) The Ministry of Administration of the central government designated 19 villages nationwide as 'model villages of informatization' in the year of 2001, after the precedent of Hwangdun *E-village* Project. Several of them have been making progress, while the remaining majority is still on the paper.
3) Table: Population of Shinlim-myon and Hwangdun, 1970-2000

Year	Shinlim-myon		Hwangdun	
	Households	Population	Households	Population
1970	2,039	11,179		
1980	1,679	8,064		
1990	1,462	6,005		
1995	1,510	4,908		
1996	1,515	4,733	395	1,269
1997	1,525	4,578	396	1,231
1998	1,542	4,492	390	1,175
1999	1,556	4,464	401	1,167
2000	1,545	4,307	398	1,122

Note: Shinlim-myon, where Hwangdun belongs to, is a part of Wonju City.

4) The LAN installed covers only the central part of Hwangdun, i.e., Hwangdun 1-ri and Songgye 1-ri. The periphery, Hwangdun 2-ri and Songgye 2-ri, is not connected with the high speed communication network.
5) A competing perspective of the diffusion studies is *'the adoption perspective,'* the traditional approach to the studies. It focuses upon the process by which adoption occurs, or the demand aspect of diffusion. The adoption perspective is best represented in geography by the work of Hagerstrand (1967).
The adoption perspective implicitly assumes that all individuals have an equal opportunity to adopt, and focuses, therefore, upon individual characteristics to explain differences in the actual times of adoption. By contrast, *the market and infrastructure perspective* takes the stance that the opportunity to adopt is unequal. Accordingly, focus is upon the process by which the conditions for adoption are made available to individuals, that is, the supply aspect of diffusion.
The market and infrastructure perspective of diffusion studies conceptualizes diffusion as a process involving three activities. The initial activity is the establishment of diffusion agencies through which the innovation will be distributed to the population at large. As a second activity, a strategy is implemented by the diffusion agency to induce adoption among the population in the service area. Only, third, then, is adoption of the innovation, the focus of most previous research. (Brown, 1981, 3-9)
6) Another recent survey on Hwangdun (Choo 2001) found that the villagers used the Internet largely for browsing the community homepage (20.4%) or newspaper (18.3%), for seeking agricultural information (16.1%), or for entertainment (10.8). Only small number of people used the online services of home-banking and home-shopping. Few villagers used the Internet for selling their products as well.
7) The survey by Choo (2001) also found that the majority (80.0%) of his sample respondents in Hwangdun were very proud of the nationwide publicity and were very high of the *E-village* Project.

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