

**The Sustainability of Public Internet Access Centers:
Lessons from ICT Projects in Rural China**

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Abstract

As most of the rural information centers are pilot or demonstration projects financially supported by governments or external donors, the sustainability of the Internet services has become a big concern. Despite some heartening experiences from developing countries, it still remains unclear whether the pilot projects can be replicated beyond the demonstration phase and broadened in scope. There is a lack of understanding about the full costs involved in running information centers as well as the social and economic benefits that accrue from improved access to information via the Internet (Quibria & Tschang, 2001).

With an aim to examine and identify the social and economic factors that may facilitate or impede the sustained access and use of rural Internet centers, a field study on an ICT project was conducted at Tongnan County, Chongqing Municipality in 2005. It is among five poor counties covered by the Project on Poverty-Reduction through Access to ICTs, jointly sponsored by the Chinese Ministry of Science and Technology (MOST) and UNDP.

The Internet project covered in this study has yielded valuable empirical data on running Internet services in rural areas. The findings of the study suggest that the rural land system and the modes of production are crucial factors determining farmers' information needs, which in turn shape the adoption and use of the Internet. The low information needs of local farmers, the disempowerment of rural administrations, and the poor collective revenues foreclosed the grassroots initiatives in sustaining the Internet initiatives in Tongnan. The findings show that at the current stage, the Internet application initiatives have to depend heavily on the strong commitment and support of local governments. Only by incorporating Internet diffusion into the rural development strategies could the government administration at various levels mobilize the social, financial as well as human resources under their control to ensure the implementation and sustainability of public Internet access services in rural areas.

The Sustainability of Public Internet Access Centers:

Lessons from ICT Projects in Rural China

As a developing country with both the largest population size and the largest rural population segment, China has witnessed unprecedented economic growth during the last decade. Since China's first full-function linkage with the Internet in 1994, it has undergone a phenomenal growth of the Internet. After a modest beginning in the mid-1990s, China now boasts the world's second largest population of Internet users¹, which stood at 137 million people by December, 2006, a big jump from 620,000 users in 1997 (CNNIC, 1997; CNNIC, 2007) . There are 59.4 million computer hosts, 1,803,393 domain names registered under "CN" and 843,000 websites in China.

The Internet penetration in China, however, is basically an urban phenomenon that excludes the majority living in rural and remote regions (Wacker, 2000). The number of rural Internet users is about 0.5 million, accounting for approximately 0.4% of China's total Internet users (CNNIC, 2007). The poor communication infrastructures, low level of knowledge and limited incomes have put the rural people in a disadvantaged position, resulting in a huge digital divide between the urban and the rural, the more developed coastal areas in the east and vast rural areas in the west.

Despite its low penetration in the vast rural areas, the Internet is generally perceived as a new engine for rural empowerment and quite a number of experimental projects have been started in different parts of China in recent years to test such an assumption. This study attempted to examine and identify the social and economic factors that may facilitate or impede the sustained access and use of rural Internet centers by conducting a case study of an ICT project in western China.

Critical Issues Regarding ICT4D in Rural Communities

Past studies suggest that access, cost and level of education remain to be the main barriers to the development and diffusion of the Internet in the rural areas as far as developing countries are concerned (Brown, 2001; Chowdhury, 2000; Heeks, 1999). First, the underdeveloped rural economy and infrastructure can hardly sustain the usage of such an advanced technology as the Internet. Second, the high costs associated with Internet adoption, such as the expense of computer hardware and connectivity, have placed the Internet out of the reach of farmers. Third, whereas old ICTs like radio, television and telephone do not make high demands on users' skills, the application of the Internet requires the acquisition of E-literacy and general knowledge. Due to the low level of education, rural people would continue to be bypassed by the technology even if they were provided with ready access to the Internet.

Despite the digital divide between the industrialized and developing countries and between the urban and rural areas within countries, there is a lack of understanding on the diffusion and usage of the Internet among rural people. Owing to much of the hype about the role of ICTs in poverty reduction and education promotion, many ICT-related research and

¹ China Internet Network Information Center (CNNIC) defines the Internet user as a Chinese citizen who uses the Internet at least one hour a week.

discussions do not seem to differentiate between what the Internet can be expected to achieve and what has actually been achieved. Consequently, there is a huge divergence between romanticized arguments of ICTs and empirical findings so far underpinning these claims. Furthermore, most of the empirical experiences are anecdotal in nature and lack theoretical conceptualization and sound methodological design. Despite shortage of theory-oriented research, several salient issues of concern arise in the extant case studies conducted in developing countries.

Policy Environment and Political Commitment

Though the advances of ICTs have made the information access and sharing much faster, cheaper and easier than before and technologies per se promise the possibility of a networked age where everyone is more or less connected, it is vitally important to take note of the underlying constraints of ICTs, especially concerning the integration of rural areas to the global knowledge economy (World Bank, 1995). Chapman and Slaymaker (2002) contended that as the reliance on market forces to ensure development and alleviate poverty proved to be ineffective, societies required government policies and initiatives to exercise social regulation and guarantee a balanced distribution of the benefits of ICTs among different social segments. The new landscape requires shifts in public policy both at the national and global levels to harness the technological transformations for public good.

Camacho (2001) asserted that the digital gap resulted from social and economic gaps and therefore the disparities would continue to widen with the uneven diffusion and adoption of the Internet. The author further stressed that the level of technology access and use was directly related to the electrification, telecommunication and education. Therefore the responsibility rested upon the government and its institutions to adapt its development strategies to the information needs of rural people.

The United Nations Commission on Science and Technology for Development (UNCSTD) Working Group on IT and Development concluded that every country should establish and implement a national ICT strategy to build capacities for producing, accessing and using ICTs. In order to be part of the global information infrastructure and the global knowledge economy, developing countries need to coordinate actions through national ICT strategy to “build the necessary scientific, technical, and engineering knowledge as well as the management techniques and social and economic institutions that are consistent with creatively using ICTs to reap the potential social and economic benefits” (Mansell & Wehn, 1998, p.7).

Collective Access Points

Based on the case studies of rural telecenters in Africa, Benjamin (2001) and Butcher (1998) argued that governments should take deliberate measures to ensure rural population's access to the Internet and community centers or infocommunes were considered an important implementation strategy to prevent marginalized communities from being further marginalized in terms of ICT access and utilization. This view is consistent with Mansell and Wehn's (1998) argument that poor countries should not emulate the predominant model of “one person-one telephone-one Internet access point” in the West because of large sized population and weak infrastructural base of ICTs.

The collective access points have been termed as telecenters, knowledge centers, information centers and information kiosks. Sood (2003) defined information kiosks as

“multifunctional and networked installations at rural locations in developing environments that seek to use information and communication technologies (ICTs) to bring new access to content and services to rural citizen-consumers” (p.6).

It is documented that India houses over half of the information kiosk initiatives in the world with the rest scattered in other developing regions like Africa, Latin American and Southeast Asia and as many as 5.7 million rural users have actually benefited from ICT-enabled projects in India (Sood, 2003). The rural information networks in India have enabled poverty-stricken people to seek information on medical care, make online transactions and send or receive emergency messages. The village information kiosks are also beginning to function as virtual institutions such as banks, postal offices, medical centers and public libraries through providing remote access to institutions at the municipal level (Sood, 2003).

Best and Maclay (2002) proposed that networking the rural regions would benefit from the “Metcalfe Effect”, which meant that the value of the network to other Internet users grew with each additional user. In other words, the more users get connected with the network, the more value the Internet will be endowed with. The linkages among the diverse transaction parties over long distances will enhance the value of the whole rural network. Another advantage of the Internet kiosks lies in that they can ensure equality in terms of content and service access and help to improve the quality of government services and increase transparencies and accountability (Sood, 2003).

Sustainability

As most of the rural information centers are pilot or demonstration projects financially supported by governments or external donors, the sustainability of the Internet services has become a big concern. There is a lack of understanding about the full costs involved in running information centers as well as the social and economic benefits that accrue from improved access to information via the Internet (Quibria & Tschang, 2001).

Several large-scale projects in India have proved to be financially viable under the joint sponsorship of the local government and private sectors. The state governments of Andhra Pradesh and Karnataka have cooperated with the private telephone companies (such as Reliance) to install fibre optic infrastructure and information kiosks in villages. Around 7,500 information kiosks have been set up in each of the two states, which cover one fourth of the total villages. Each user is charged a transaction fee for sending application forms of obtaining income/caste/domicile certificates, accessing market information and putting one’s commodities for sale online, etc. The service-fee-charging model proves to be an effective way of keeping the rural Internet services financially viable, sustainable or even profitable (Quibria & Tschang, 2001).

However, the public-private partnership that has functioned in India does not seem to work in rural China. As Ulrich (2003) pointed out, it was not possible for most villages to support viable telecommunications businesses based on the relatively small population sizes. Without subsidies to villages for paying online access charges, there was little incentive for them to expand the usage. As a result, charging for services for future sustainability was not the answer to the expansion of ICTs in China, at least at the present stage. Other factors which may influence the usage and viability of Internet services include the relevance of Internet content to the needs of farmers, the farmers’ command of basic IT skills and the

complimentary role of the Internet to traditional means of communication (Quibria & Tschang, 2001).

Despite some heartening experiences from developing countries, it still remains unclear whether the pilot projects can be replicated beyond the demonstration phase and broadened in scope. Much more micro-level research is needed to understand and assess the impacts of ICTs on the livelihood of the rural people, such as to what extent these rural Internet-based services can be accessed by the rural poor and how they help to generate incomes, promote education and health, and enhance participation.

Research Design

The Project on Poverty-Reduction through Access to ICTs, jointly sponsored by the Chinese Ministry of Science and Technology (MOST) and UNDP, was examined by this study to address the issue of sustainability of ICT adoption in the rural context. In view of the exploratory nature of this study, the ethnographic research design was adopted to enable the researchers to interact with the rural people under study and to observe the daily occurrences in their life. Among the five counties² covered by the project, this study focused on Tongnan County of Chongqing Municipality, which was said to have achieved the most impressive results among the five counties according to the UNDP's mid-term evaluation report (Ulrich, 2003).

The MOST-UNDP project followed a typical top-down approach, which involved a four-tiered support structure (see Figure 1). In this US\$2.5 million poverty alleviation initiative, one quarter of the funding was provided by UNDP for training and consultancies, with MOST and the five benefiting counties sharing the rest of the costs. The county government in Tongnan contributed US\$200,000. The Rural Agriculture Technology Development Center of MOST and UNDP were jointly in charge of the operation of the project. The Beijing headquarters provided trainings to technicians from the project sites and sent technical experts to guide and evaluate the implementation work at these participating counties.

Among the five participating counties, Tongnan has the least developed economy despite its size, with a population of 920,000 residing in its 31 towns and 281 villages. The county UNDP office was equipped with networked computers, photocopiers, printers, digital cameras as well as projectors to organize computer training for information technicians from the surrounding towns and villages. Two township Internet centers were set up to report to the county office and each town had two village Internet centers to cater to the information needs of local villagers.

² The five counties covered by the pilot project are Yuyang district of Shanxi Province, Wu'an city of Hebei Province, Huoshan County of Anhui Province, Shangcheng County of Henan Province and Tongnan County of Chongqing Municipality (Ulrich, 2003).

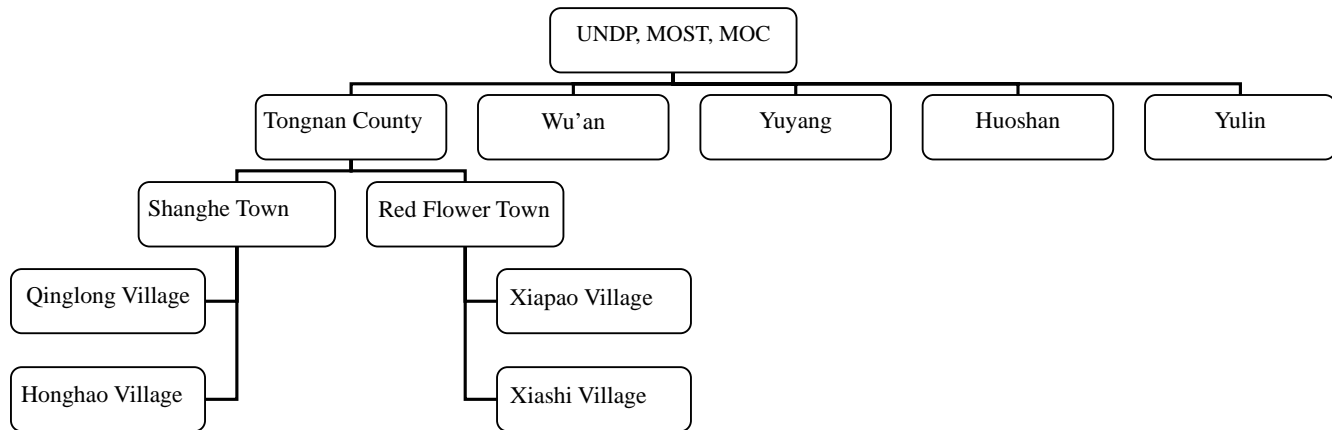


Figure 1. The structure of the ICT project.

The field work took place in May 2005, a year and a half after MOST and UNDP stopped their funding for the project. This allowed the researchers to observe the sustainability as well as the operation of the project. The data collection methods comprised in-depth interviews, participant observations and documentary analysis. The strategies of maximum variation and snowball sampling were employed to recruit interviewees. At each site, government officials in charge of the ICT projects, technicians and village administrators were first interviewed. In turn, these people recommended other candidates for interviews (see Appendix A for List of Interviewees).

The field observation focused on the everyday experiences of the local Internet users and the daily activities at the Internet centers. Particular attention was paid to Internet access mode and usage patterns, the frequently used functions and websites visited, and the ways that the Internet could possibly impact the farmers' life. Documents on the development of the local communities and indigenous publications were collected and analyzed to supplement the information obtained from interviews and personal observations.

The "constant comparative technique" was employed by this study to analyze the interview transcripts, field notes, field diaries and documents collected (Wimmer and Dominick, 2000, p.107). Four steps comprised the data analysis process. First, the method of coding and

indexing was used to segment incidents into meaningful categories or themes. This required repeated reviews of data collected to identify and describe some recurrent topics from the perspectives of the participants. The texts which clustered around the same topic were sorted out and labeled under a category.

The second step involved the refinement and elaboration of categories. The researcher should come up with an exact definition of each category and rules governing the inclusion of incidents must also be established to narrow the focus of the study. Third, interrelationships and common regularities and patterns were derived across categories. Assertions were generated to offer further clarifications regarding the phenomenon under study. Fourth, the researcher integrated the results of the analysis into a logical interpretation of the social reality. The informants' experiences and the meanings they attached to them were reconstructed through the report of summarized findings.

Findings

The Project

The primary motivation for the county government to apply for the Internet project was to get the funding. It was hoped that the government office facilities, both at the county and township levels, could be upgraded and government websites could be set up so as to enhance work efficiency and facilitate the daily administration.

During the first year of the project, most efforts were spent on recruiting information technicians, conducting trainings and creating project awareness in the surrounding towns and villages. As there was a severe shortage of computer literates, the county's office set up for the UNDP project invited experts from outside to teach basic computer skills. Despite the fact that the majority of the 24 information technicians had no prior knowledge about computers and the Internet, they managed to learn how to type, search and post information online, and handle emails within a month of training. An advertising campaign was launched to promote the project, using the local newspapers as well as radio and TV broadcast. Wall posters, bus banners and sign boards were also put up to target the rural residents not accessible by the print and electronic media.

The UNDP centers at the townships and villages started operation in late 2001 with two computers, a printer, a photocopier and a fax machine installed in each of the project sites. The small-scale farming economy was prevalent in the project sites, with self-sustained cultivation and livestock breeding as the chief modes of production. The major land produces included rice, grain, sweet potatoes, peanuts and rapeseeds. Almost every family kept a few pigs, which brought in about 40% of the household income.

In Shanghe Town, the household fixed-line telephone penetration (10%) was much lower than that of Red Flower Town (31%), but their TV ownership was about the same (a little bit over 70%). Half of the farmers in Shanghe left their land and migrated to other places for job opportunities and the corresponding figure for Red Flower was one third. The majority of the rural residents had an average of six to seven years of schooling.

As the Internet centers at the township level were built with the same design, only that of Shanghe was described here in detail. The UNDP project center in Shanghe was located inside the township government building. It was supposed to cater to the information requests from farmers in all the surrounding villages. Affiliated to the local government, the two

information technicians worked only part-time at the center, which opened half a day when the villagers gathered for the town fair held in every three days.

During the non-farming seasons, the information centers were crowded with farmers, whose information requests ranged from prices of farm produces to cultivation skills, and from health care to external job opportunities. Most often the online searching results would be printed free-of-charge and the technicians would also help to explain the findings to the farmers. Handouts of farming information downloaded from the net were also distributed to the farmers. The most frequently visited websites were the local agricultural websites and government websites.

The local farmers found the information service very useful and practical. For example, they would come to the center for information when their pigs contracted an unknown disease and the veterinary was not around, or for information regarding the sanitization of pens and the right additives to the forage. The township UNDP center served as a link between the village centers and the county office. The information technicians at the township center offered technical support whenever the computers at the village centers were down.

All the four village Internet centers were located inside the primary school at each village. The mud-bricked house, wooden benches and the barefoot students offered a sharp contrast to the wired computers sheltered under the same roof. The village centers played an important role in the Internet diffusion and usage in rural areas as they provided farmers with the opportunity to directly operate the computers and surf the net. In addition to providing training for farmers in using the Internet, the center also invited agricultural experts and technical staff to lecture on new seeds, the control of pests as well as computer literacy. The trainings were carried out in several phases to target different segments of people. Young farmers with some years of schooling or outside working experiences received computer training first. Then it was the turn for young women who were followed by the middle-aged or elder farmers with an interest in the Internet. The training was finally given to students in the primary schools.

Though the young schoolers were among the last to receive the training, they were the quickest to adopt the technology. It took longer for the older generation to get rid of their technophobia. Many adults were unwilling to scrub the mouse against the pad, believing that constant friction might make the mouse less durable. The quick adoption of the Internet among the kids resulted in the phenomenon of "proxy usage" (Ulrich, 2004, p.20), as most of the information searching was conducted by the school kids for their parents.

In Qinglong Village of Shanghe Town, the village head and a teacher of the village primary school served as the information technicians for the village center, whereas in Xiashi Village of Red Flower Town, the village head and a better educated farmer acted in that capacity. Outside the village centers there were posters to publicize the UNDP project as well as useful agricultural information gleaned from the Internet.

Business-oriented farmers seemed to have benefited most from the information services in monetary terms. Liu Xiaolan in Qinglong Village ran a grain shop in the village. She collected rice, peanuts and rapeseeds from fellow villagers and sold them later at a higher price. Prior to the existence of the UNDP center, Liu depended on fellow villagers who had gone to the county seat for information about grain prices. Often inaccurate messages resulted in big losses for her. Naturally, the Internet became a reliable source for her to know prices of various farm produces. Liu visited the center every other day to ask the technician to search

the net for updated prices of farm produces as well as analysis of market fluctuations. When she learned from the Internet that the price of the rapeseeds was going to drop, she immediately sold her stock at a reduced price. She also warned her fellow dealers about this, but none of them believed in her and as a result they suffered dearly when the price fell dramatically a few days later.

Xiashi Village was known for its knitted bamboo sheets, a handicraft passed on from one generation to another in the village. The product used to be sold within the province only due to the lack of information about the markets elsewhere. With the Internet, the villagers could sell their bamboo sheets to other parts of the country by posting information about their products on the county's website, which also listed a phone number for potential buyers to call to place their orders. One of the villagers engaged in this business estimated that he earned US\$1000 more a year as a result of this online help.

The UNDP projects came to an end in the late 2003 after the funding for this experiment was drained and activities at the town and village centers soon began to dwindle. With the termination of the funding, the centers could no longer cover the costs incurred by the network access, electricity as well as maintenance fees. The UNDP county office still remained as part of the county government, whereas the township and village information centers all closed their services in mid-2004.

Today the excitement about the Internet all died out except in the local farmers' account of their experiences with the technology. At the county seat and the two townships, all the computers and network facilities installed for the UNDP project are now used by the government offices. In Xiashi Village, the fax machine is taken by the village head as telephone and the computers are locked up in a warehouse. In Qinglong Village, the village head keeps the computers in his own house, sitting idle. Many of the information technicians trained for the project have left their hometown and found jobs elsewhere.

The life of the farmers has gone back to the normal. Some farmers attribute the collapse of the Internet project to the termination of the funding, while others see themselves as guinea pigs for experimentation and consider it natural for the centers to close since the experiment is now over. Liu Xiaolan continues to run her grain business even though she feels handicapped when the updated information is no longer easily available. But Liu does not see anything that she can do to reverse the situation. The bamboo sheets business has become so successful that the farmers no longer need the Internet as the local markets can absorb all the products they are able to produce.

Discussion

In a developing country like China, as the diffusion of the Internet requires large investment and advanced knowledge for its users, the new communication technology is unlikely to diffuse on a large scale in the vast rural areas where the access to the Internet is not only handicapped by the underdeveloped economy but also by the lack of adequate telecommunication infrastructure and personal skills in computer technology. As a result, it is highly likely that the digital divide and social disparities would be further widened between the urban and rural areas, and between the coastal and inland areas if additional efforts were not made to network the less developed regions. It is within such a context that the UNDP Project was launched with the aim of using the Internet as an efficient tool to alleviate poverty and

narrow the digital divide between the urban and rural areas.

As the Internet does not come to the farmers as a natural step in the social and economic development in the rural areas, the diffusion and utilization of it is very much influenced by the planners and therefore takes place in an artificial environment. In Tongnan's case, the Internet diffusion did not rest with the will of individual farmers, who had neither the financial means nor the immediate needs to lead them to the Internet. Instead, the international development agency and the local government played a major role in shaping the Internet diffusion and adoption among the poverty-stricken people. The technology was pushed to its targeted beneficiaries regardless of the strength of the local economy to sustain such an advanced technology and the individuals' needs and readiness for the innovation adoption.

As far as the goal of the project is concerned, it has failed to demonstrate its capacity in alleviating poverty through the Internet diffusion. At the planning stage of the project, it was prophesized that the level of economic development for the towns and villages with Internet access would be five years ahead of those without. However, the disappointing fact is that the economic development at the project sites does not differ much from their neighboring villages.

The field observations and interviews point to a few factors that may be conducive to the weak sustainability of the UNDP project in Tongnan County. First, the pro-innovation bias prescribes the top-down approach to diffusion, the process of which is guided by the communicators' target goals rather than the recipients' needs for the Internet. The planners were not aware that the will of bringing about changes, no matter how good natured it was, could not substitute for individuals' motivation for change.

As a result, the promotion of the Internet failed to coordinate the goals of various parties involved in the project. While the UNDP and MOST at the top would like to achieve poverty reduction through facilitating farmers' access to information, the county government hoped to upgrade its office facilities through the project so as to improve the efficiency of its administration. The local government officials claimed that the Internet access should be made widely available at the county level first in order for its benefits to trickle down to the townships and villages. Farmers at the bottom of the project structure, on the other hand, were reluctant to adopt and use the technology unless its economic benefits were evident. These differences in interests and expectations worked against the project from the very start.

The top-down approach also left much room for intervention by the government, confirming what Delman (1993) found in his study of agricultural extension in China. The Internet had to go through every level of the bureaucratic system before it finally reached the farmers, the targeted beneficiaries of the project. The financial control exercised by the Ministry of Commerce over the project also made it inflexible to make necessary adjustment to suit local conditions. The overseas trips made by the government officials as well as the decision to purchase the computers and other equipment in Beijing and send them via air freight to the project sites, resulted in excessive high costs of the project and its short life span. Moreover, the top-down approach also allowed the officials at different levels of the hierarchy to use the project for their own benefits. To a certain extent, the officials controlling the projects ended up benefiting most from the termination of the project by taking over the equipment for their institutional or even personal use.

Secondly, the rural land system and the modes of production are crucial factors

determining farmers' information needs, which in turn shape the adoption and use of the Internet. The household contract responsibility system (also known as "the contract responsibility with remuneration linked to the output") was adopted by the Chinese government in 1978, the starting point of China's modern economic take-off (Fei, 1989, p.233). Under the system, the individual household or farmers were responsible for their own loss and gain in farming, whereas such responsibility was previously shouldered by the communist collectives (Chu, 1986). The implementation of the house contract responsibility system proved to be a strong impetus to the farmers at its start because the farmers were allowed to keep whatever they produced after paying their taxes to the state.

As the land allocated to each household had to be further shared by the male offsprings, the tension between the shrinking arable land and the ever growing rural population became the root of many rural problems. In Tongnan's case, the per capita arable land, most of which is on high plateau, averages only 0.9 mu (about 600 m²). The limited land plus its geographic location does not allow mechanical farming as in Western countries. As a result, the modes of production are still dominated by manual labor using animal power and primitive farming tools. With such a self-subsistence economy, farmers produce mainly for their own use and they need to engage in sidelines such as pig raising to supplement the family income.

With such a primitive farming economy, farmers in Tongnan do not need a big market to sell their produces and make purposes for reproduction, and therefore experience less needs for information. Even though most of the farmers were aware of the advantages offered by the Internet and witnessed the financial benefits it brought to some of the early adopters; they could not sense an immediate connection between the technology and their life. The small-scaled farming allowed the local people to produce merely enough for the family to consume and exchange for other daily necessities at the town fairs. This explained why the Internet only appealed to the rural residents who were engaged in trading farm produces and whose needs for market information were greater than their fellow villagers.

Our discussion so far could only partially explain why the Internet project could not become self-sustainable despite its popularity among the adopters and the potential benefits it could bring to some of the rural people. With the computers and other network facilities already in place, the monthly expenditure of a village information center was around 25 US dollars to cover the electricity, phone bills, Internet access as well as printing fees. The collective Internet access could still remain financially viable if the township government and the village administration would chip in.

However, with the implementation of the household contract responsibility system, collectivism championed by the former communes has been replaced by individualism as farmers depend on their personal efforts rather than collective action for economic development. Moreover, with more and more farmers leaving their land to join the migrant labor force in big cities, the village administration no longer acts as a leader and planner for rural development and can not interfere in the farming decisions of the villagers. Furthermore, the recent reduction of land taxes also affects the funding of the town and village administrations. In general, the weakening of collectivism and the disempowerment of rural administrations foreclose any concerted efforts aimed at improving the local infrastructures and the social welfare.

In addition to the identification of social factors at the contextual level, the findings of the

study show that individual characteristics also play a part in molding the differentiated Internet adoption and use patterns among the rural people. The pre-existing disparities in age, gender, income, education, and social positions resulted in an unbalanced access and usage of the Internet services. The new communication technology tended to favor those schoolers and young males and bias against the old and the female. The “proxy usage” phenomenon revealed the evolving prefigurative culture as proposed by American anthropologist Margaret Mead (1970). The older generation could never catch up with the young in terms of the adoption of innovations and therefore had to rely on their assistance to harness the technology for development purposes. With respect to the daily access, the members of village committees and the villagers who had close connections with them had more opportunities of enjoying the information services. Those who derived most financial benefits included better-off farmers engaged in business deals or those who had an enterprise to work at.

Conclusion

The UNDP project in Tongnan provides us some unique insights on how various social factors could affect the Internet diffusion and adoption among the rural residents. The experience of Tongnan shows that the top-down approach of the project, the bureaucratic interventions, the household based subsistence economy as well as the disempowerment of the local organizations all contributed to the weak sustainability of the UNDP project.

As the Internet did not come to Tongnan as a natural stage of its socioeconomic development, its diffusion and usage were strongly influenced by the change agency, whose purpose to introduce the new technology shaped the diffusion patterns of the Internet, which in turn molded its usage and implications for rural development. The over extensive structure of the project, which allowed bureaucratic interventions at various levels, resulted in conflicting goals among different parties involved in the project and less concerted efforts in achieving the objective of poverty alleviation through information.

The short-lived project could be partly attributed to its inability in incorporating the development needs of the local people, which are essential for wide adoption and sustained usage of the new technology. The dominance of the subsistence economy and the backward production modes determine the limited information needs of farmers, which can be easily satisfied by the existing communication channels such as TV and word of mouth. For the majority of the villagers, the Internet could not make any fundamental differences in their own development.

Despite some anecdotal experiences of success in securing financial benefits from the Internet, the information services did not make much impact on the overall social and economic development in Tongnan. Although the Internet brought convenience to farmers' life by increasing the ease of accessing information and knowledge, its perceived advantages were only applied to those innovators and early adopters. To the overwhelming majority of people at the experiment sites, their perceptions of the Internet only stayed at the awareness level. As the Internet technology was pushed to the farmers as an act of government intervention and the advantages of adoption could not be seen by the potential beneficiaries, the project was not very much appreciated and therefore could not be sustained due to the lack of synergies.

It is impossible to gain an in-depth understanding of the intricate relationship between the Internet and rural development without a view to the rural land system and the policy-making at the local government. The lack of a collective drive for the building of infrastructure and the planning for economic development proves to be a big handicap to the Internet diffusion and adoption in the rural areas when the Internet does not come as a natural step either in the socio-economic development or the growth of the telecommunication infrastructures in the rural areas. When the local governments feel less powerful in organizing collective projects, the Internet, which is pushed to the farmers, is bound to fail as a self-sustainable development.

As the Internet involves considerable operating costs at the post-adoption stage, such as regular access fees and maintenance costs, this may to a great extent affect the sustainability of Internet services at rural areas. The Internet project covered in this study has yielded valuable empirical data on running Internet services in rural areas. This study concludes that the low information needs of local farmers, the disempowerment of rural administrations, and the poor collective revenues foreclosed the grassroots initiatives in sustaining the Internet initiatives in Tongnan. The findings show that at the current stage, the Internet application initiatives have to depend heavily on the strong commitment and support of local governments. Only by incorporating Internet diffusion into the rural development strategies could the government administration at various levels mobilize the social, financial as well as human resources under their control to ensure the implementation and sustainability of public Internet access services in rural areas.

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Appendix A

Interviewees from Tongnan County, Chongqing Municipality

No.	Name	Gender	Age	Occupation
1	Xiangyi	Male	49	Office Director of Tongnan County Government, the former head of UNDP Project
2	Wang Fanyao	Male	40	Director of the Science and Technology Commission of Tongnan County
3	Li Huanyun	Male	36	Division head of the Science and Technology Commission of Tongnan County, the former information technician of UNDP Project
4	Tang Zhenhai	Male	35	Deputy Director of the Agriculture Bureau of Tongnan County, the former information technician of UNDP Project
5	Li Haofu	Male	32	Office Director of Shanghe Town Government, chief-in-charge of the town UNDP centre
6	Wu Yingying	Female	26	Net bar owner in Shanghe Town
7	Liu Xuhe	Male	43	Information technician of Qinglong Village, Party secretary
8	Li Changji	Male	53	Head of Qinglong Village
9	Liu Hong	Male	42	Information technician of Qinglong Village, village school teacher
10	Liu Xurong	Male	61	Drugstore owner of Qinglong Village
11	Liu Xiaolan	Female	40	Farmer of Qinglong Village
12	Li Mingchun	Male	41	Deputy head of Red Flower Town
13	Li Haode	Male	29	Office Director of Red Flower Town Government, chief-in-charge of the town UNDP centre
14	Li Zhenhe	Male	43	Party secretary of Xiapao Village
15	Jiang Hongbing	Male	43	Information technician of Xiashi Village