

Exploring the ICT and Rural Poverty Reduction Link: Community Telecenters and Rural Livelihoods in Wu'an, China¹

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ABSTRACT

Applying the 'Rural Livelihoods' framework of analysis, this study explores the link between information and communication technologies (ICTs) and rural poverty reduction by analyzing the role of community telecenters in enhancing the livelihood strategies of rural poor households. The 'Rural Livelihoods' framework argues that interventions that play a role in facilitating an increase in the poor's livelihood assets and resources and facilitate diversified livelihoods have a potential for reducing poverty. Using telecenters set up by the United Nations Development Program (UNDP) and the China Ministry of Science and Technology (MoST) in selected rural villages in Wu'an, China as case studies, the paper explores the direct and indirect role that telecenters play in facilitating the poor's access to more livelihood resources and assets and in influencing the adoption of diverse livelihood strategies. Findings show that while the intensity of the changes experienced cannot support the claims about the transformative role of telecenters on the rural poor, these have some positive implications on certain aspects of rural poverty. These implications extend not only to economic aspects (such as better earnings or production), but to human (such as e-literacy and new farming techniques) and social (such as creation of venues for community integration and knowledge sharing) dimensions. The paper gives emphasis on specific conditions and factors that motivate rural communities to use telecenter facilities and obtain useful information, and those that facilitate the translation of information into the construction of diversified livelihood strategies.

Keywords: Telecenters, Rural Livelihoods

1. INTRODUCTION

This paper explores the link between information and communication technologies (ICTs) and rural poverty reduction by analyzing the role of community telecenters in enhancing the rural poor's livelihood. Telecenters are major catalysts for information and knowledge that can create development opportunities and choices for rural communities. These can, under certain conditions, help improve the living conditions of the rural poor through better and more sustainable livelihood strategies (UN, 2004: 2-3).

¹ Conference Paper presented during the Living the Information Society: The Impact of Information and Communication Technology on People, Work, and Communities in Asia, Manila, April 2007.

² This research was undertaken under a scholarship grant from the Asian Scholarship Foundation. The researcher was a Visiting Research Fellow at the Institute of Sociology and Anthropology of Peking University for the duration of the project (Oct 2005-Aug 2006), but takes full responsibility for all weaknesses or errors in this paper. Comments are welcome and may be sent directly to cheryllsoriano@yahoo.com or cheryllsoriano@gmail.com

Making telecenters available in rural communities, however, does not guarantee that poor people will and can use them to create and share knowledge that could help lift them out of poverty. While telecenters are considered as “a powerful engine of rural development and a preferred instrument in the fight against poverty” (World Bank, 2005 cited in IDRC 1999), others take the more cynical stance, arguing that funds are better spent on traditional forms of development assistance. Further, whereas some telecenter models (i.e. Grameen project in Bangladesh) have been considered good practice by empowering poor communities through new technologies, the failure and massive under-use of some telecenters set up in developing countries have raised doubts over their relevance for poverty reduction and sustainability (Heeks, 2005). As telecenter investments represent opportunity costs and are not used for other development or poverty reduction areas, such as roads or food security, it is imperative to determine the ways they benefit the rural poor, so that future investments may be more appropriately programmed.

China is an interesting case for research on the potential of ICTs for rural poverty reduction because more than half of China’s population is concentrated in the rural areas and the number of rural poor therein comprises about 10% of the world’s total.³ The unprecedented achievement of China in terms of rural poverty reduction over the last decades has been recognized by several studies worldwide (UN 2005, Fan et al., 2002, World Bank, 2001). They also have an emerging ICT sector and a government committed to harnessing the potentials of ICTs to achieve development goals. China is committed to invest US\$1.4B to alleviate poverty through ICTs (UN-ESCAP, 2004: 15), expecting these to be the new driving force in the allocation of agricultural resources, upgrading traditional agriculture and improving productivity⁴. The Chinese government is pushing community telecenter projects to provide information access for poorer rural areas, one of which is the subject of this paper.

2. RURAL LIVELIHOODS FRAMEWORK OF ANALYSIS AND RESEARCH OBJECTIVES

Information and communication are widely recognized as basic and fundamental elements of any development activity. At the same time, they are central components in the rural livelihoods approach as they provide the linkages that maintain its dynamic structure. Yet, they remain poorly integrated within emerging livelihoods approaches. As such, this paper uses the Rural Livelihoods Framework to analyze ICT developments and interventions for rural poverty reduction, by using rural communities in China as case studies.

The ‘Rural Livelihoods’ thesis argues that the reduction of poverty hinges on the capability of the poor to combine different livelihood strategies and sources. This allows them to become less vulnerable to shocks and risks. As diversity is related to flexibility, resilience and stability, diverse livelihood systems are seen to be less vulnerable than undiverse ones (Ellis, 2000; 1999: 8-9). This implies that relevant to improving livelihoods are interventions that facilitate diverse household strategies and opportunities. A key concern is directed at institutional arrangements, policies, and interventions that help the rural poor achieve more secure livelihoods⁵.

Robert Chapman et al. (2004) emphasized the importance of ICTs both in generating information required by the rural poor to make decisions on livelihood strategies and generating information required by institutions responsible for making decisions about

³ An estimated 1.1 billion people in China do not meet the \$1 a day poverty line

⁴ By Gao Zuoyu, Official of the Ministry of Agriculture, P.R. of China. <http://www.china.org.cn/english/null/105543.htm>.

⁵ A detailed discussion of the framework is also provided in Frank Ellis (2000). “Rural Livelihoods and Diversity in Developing Countries” and in “Sustainable Rural Livelihoods: A Framework for Analysis”, in Scoones, 1998, IDS Working Paper 72.

policies and processes that affect those strategies⁶. They emphasize that effective information systems need to integrate the productivity based needs of rural communities with information.

The deployment of telecenters in rural villages brings about new technologies for accessing information and services relevant for households to intensify agricultural production, assist the adoption of diversified livelihoods, facilitate migration, or in enabling the combination of these. This access to information and knowledge can also lead to the creation of capabilities to gain more livelihood resources/assets and help reduce the poor's vulnerabilities. Using the rural livelihoods framework, this paper investigates the role of community telecenters in enhancing their access to livelihood resources and capital assets: that could, under certain conditions, improve their livelihoods. These livelihood assets include natural capital, which covers land, water, and biological resources utilized by people to generate means of survival, social capital or the social resources upon which people draw in pursuit of livelihoods, such as networks, membership of groups, relationships of trust, and access to wider institutions of society; human capital, or the skills, knowledge, ability to labor and good health important to the ability to pursue different livelihood strategies; physical capital or basic infrastructures such as transport, shelter, water, energy and communications and the production equipment and means, which enable people to pursue their livelihoods; and financial capital, or the resources which are available to people and which provide them with different livelihood options (Ellis, 2000:31-37).

Further, critical in this study is finding the conditions under which telecenters can be useful as tools for improving livelihoods. Thus, besides looking at the livelihood information, content, technology and communications media made available, it looks into conditions that help motivate the rural households to access relevant information from the centers. It also looks at the factors that help them overcome their fear of technology, and elements that can influence them to take action in using information they accessed towards enhancing their livelihoods. This is illustrated in the following framework (see Figure 1), adopted and revised from Wang (2003), from which the succeeding discussions of cases are organized.

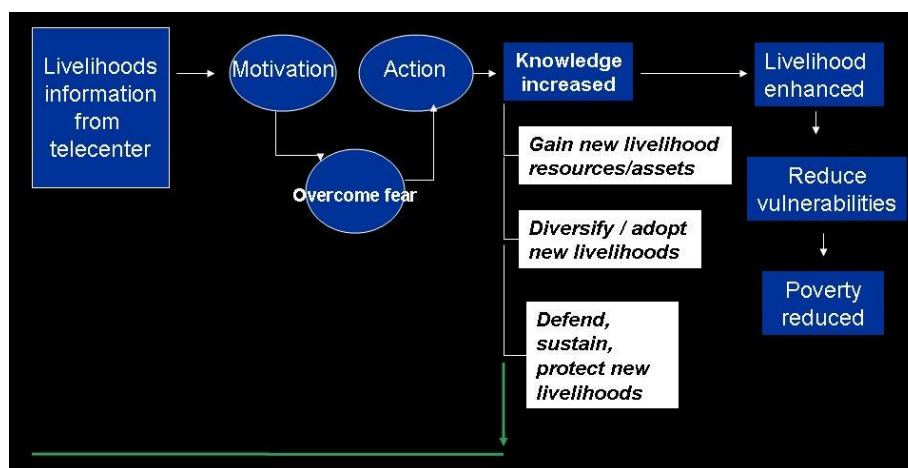


Fig 1. Community Telecenter and Rural Livelihoods

⁶ The DFID has also developed a set of matrices to more easily identify linkages between the Livelihoods Framework and ICT4D interventions. See the *DFID Sustainable Livelihoods Guidance Sheets* at www.livelihoods.org.uk

3. FINDINGS: THE CASE STUDIES

The “Information Access Center Project”(Xin Xi Fu Pin Wang Zhan) implemented by the United Nations Development Program (UNDP) and the China Rural Technology Development Center-Ministry of Science and Technology (CRTDC-MOST) in five pilot counties in China were selected as these aim to “use technology for reducing rural poverty”. Two villages in Wu’an which were part of the project were chosen as case studies: Pushang (mid-income), and Menwangzhuang (low-income).

A combination of research methodologies were used (desk research, field interviews, surveys and focused group discussions). A participatory survey and focused group discussions were conducted in each of the two villages in February and April, 2006. Interviews with the project leaders from the Project Center in Beijing–UNDP and MOST, the county level in Wu’an, Hebei, and the village levels were conducted. Telephone interviews were made from May-June 2006 to clarify data gathered and verify research findings. Published and unpublished mid and post project evaluations were utilized (Wang, 2003; Ulrich, 2003; Yang, 2004; Wang et al., 2005; MoST, 2005). Data obtained from a survey/interview initially conducted by the researcher with assistance from students of Peking University in February 2006 involving 30 households from each of Pushang, Shangdian, and Menwangzhuang villages was also used⁷.

3.1 Profiles and Livelihoods of Case Study Villages

Despite being considered as one of the top 10 cities of Hebei province after enjoying economic growth during the reforms of the 1980s, Wu’an still has 9 poor townships, 210 poor villages, and about 45,000 poor households. Most of Wu’an’s poor live in the mountainous Western area of Hebei, which covers 36% of the total land area and where 46.8% of the population reside (Yang, 2004: 38). Representing the unbalanced development in China, the average annual income of village households along the Eastern region is more than four times (4,000 RMB or US\$500) the income of those in the mountainous villages (less than 1,000 RMB or US\$125) in 2004. Plagued by undeveloped transportation, significant distance from the city center, insufficient mineral and natural resources, and poor human resource capabilities and basic services, Wu’an’s poor mainly depend on basic agricultural activities and livestock-raising.

Pushang, located in the South of Wu’an, has 335 households and a population of 1,165. The village, with farming area of 1,777 hectares, primarily produces flour, corn, millet, mushrooms, and feeds and has recently engaged in the production of Chinese medicine, organic vegetables and trees. In 2001, the village’s average annual income is \$103 and US\$375 in 2005. More than 80% of the households have television (about 10% of them have more than one), 50% have fixed telephone and mobile phones, and about 6 households have their own computers with Internet access. More than half of the households have members who work in other villages or cities as migrant workers. Pushang has 1 elementary school with 3 computers, 3 health centers, and all households have electricity and water.

⁷ A survey was initially conducted to obtain the household’s socio-economic profiles, livelihoods, and villagers’ perception on the telecenter’s role in enhancing their livelihoods. However, after an initial survey, it was deemed that this methodology alone poses limitations as results did not reflect the community’s livelihood strategies and provided only limited understanding of issues hindering the full adoption of technology/information and optimal benefit from telecenter interventions. Due to the abstractness of the concept of information to the respondents, vague and non-responses to surveys posed more questions that later also necessitated the conduct of interviews and FGDs for clarification. It was through extended and informal interviews with the telecenter staff and farmers/family members and focused group discussions that more honest assessments and interesting findings surfaced.

The second village, Menwangzhuang is a mountain village lying in Huoshui town which has 180 households (580 villagers), all with electricity and water sources and about 70% of whom have television and radios. The village's main livelihoods are chestnut and walnut farming (85% of households). Some households also plant green vegetables, persimmon trees, potatoes and corn and raise pigs and chickens for subsistence. More than 60% of households have at least one member of the family working in the cities or other villages as migrant workers, while about 30 young people are looking for jobs outside the village but help their households in farming activities. Menwangzhuang's declared household average annual income in 2005 is US\$181⁸. The main road connecting the mountain villages to downtown was built only in 2003. The village used to have a primary school of its own but now shares this school with other villages. There are 8 computers in the school and 2 computers in the telecenter and they all have access to the Internet. Two health centers have been set up in the village. The villagers used to rely heavily on radios but they mentioned they do not use them as often nowadays that TVs are available.

Like Pushang, Menwangzhuang households perceive that the lack of information on agricultural strategies/training and knowledge of possible livelihood activities are their top major livelihood constraints. Faced by considerable distance from the city, lack of transportation facilities, and inability to produce in large quantities, Menwangzhuang villagers find it imperative to rely on middlemen to sell their produce, thereby bringing down their selling price. Some Pushang farmers, on the other hand, are able to produce more and market their produce on their own. Unlike Menwangzhuang, Pushang is not in a mountainous area and has greater access to markets. A few small and medium enterprises (i.e. hog raising, mushroom and vegetable plantations) have also been built in Pushang which has hired local villagers as workers.

3.2 Motivation, Overcoming Fear and Translating Information into Knowledge and Action

3.2.1 Technology, Content/Services, and Information Needs

Making relevant content and services available through appropriate information and communications media can help motivate rural households to use and obtain information from the telecenters.

The project had a pyramid-shaped support structure consisting of the MoST in Beijing and county (www.wakj.com.cn), township, and village level telecenters that are all linked to the Internet and main project website (www.cstap.org.cn). Linked to each county are two township Internet centers and connected to each township are two village telecenters, equipped with two (2) computers with Internet capability, one fax machine, a telephone, a television, a VCR and various printed materials that are free of charge. The telecenters within Wu'an county were connected to other telecenter sites in Henan, Shaanxi, Anhui, and Chongqing, comprising the UNDP-MoST telecenter network. The centers carry web-sourced information made available through various media. No specific content was developed but the project website has links to other websites that carry content on agricultural techniques, pest management, possible agribusiness activities and market price information.

For both Menwangzhuang and Pushang, more than half of the households surveyed mentioned price information as the "most relevant information" accessed from the telecenters, followed by information on proper farming techniques and use of pesticides/fertilizers. They also cited that information on available jobs outside the village

⁸ Menwangzhuang villagers noted that their declared average annual income is much higher at 1,400 (Village Interviews, 2006).

and on government's major social security and health programs were important, although they noted that these were not 'commonly' available from the telecenter. The information they often searched for based on surf log include recent news, practical agricultural technology and pest management, supply and demand information for various agricultural produce, production and marketing techniques, market and price information, health advise, and household management. The staff noted that the youth also searched for employment opportunities online. A few use the telecenter for communication (i.e. E-mail).

VILLAGERS' LIVELIHOOD INFO NEEDS	TELECENTER OFFERINGS
(1) Market price; product demand (2) Agricultural strategies and other possible livelihoods (i.e. For HH members and off farm periods) - Harvest is Aug-Sept; planting is Feb-March (3) Marketing strategies for produce (Inability to market produce independently -heavy reliance on local brokers) (4) Info on how to access financial capital (5) Employment information (6) Educational resources for children (7) Health and household mgmt strategies (8) Natural resource mgmt (i.e. prevent future floods, or market village tourist spots)	<ul style="list-style-type: none"> • Link to updated market price info and product/demand info • Link to agricultural websites/content, training provided (actual and via experts online, training materials shown in VCR),networking of agricultural techniques across telecenter network <ul style="list-style-type: none"> • Posting of village produce in the BBS helped in marketing some produce and in finding buyers (Pushang only), market price info increased farmers negotiating ability w/ traders <ul style="list-style-type: none"> • "None" • As venue for social networking, allows exchange of info on jobs, but no specific content for this • Access to educational/research materials, training on web search, venue for youth networking • Health info / advise is available, able to set hospital appointments (but difficulty in searching) • Tourism strategies available; Enabled posting of village sites and products in project website

FGD in Menwangzhuang and Pushang Villages, Feb 2006

Table 1. Villagers' Perception of their Livelihood Information Needs and Telecenter Offerings

However, the telecenter was not the only information source, nor was the sole technology available in the villages. They became complementary to the villages' existing information and communication media.

According to the villagers of Menwangzhuang and Pushang, the mobile telephone serves as a convenient tool for tracing relatives and friends' (migrant workers) whereabouts, obtaining news, and relaying information on possible jobs. It also allows communication conveniently and at rates they consider affordable⁹, with each long distance call costing 2 mao (1/5 RMB or US\$0.05) per minute. The households of Menwangzhuang and Pushang still rely heavily on family, friends and village leaders as the most important daily information source and the mobile telephone serves as a convenient medium that reinforces this traditional mode of information exchange. However, there was limited content on relevant livelihood information and services that was available using mobile phones.

3.2.2 Training, Capacity-Building and the Value of Traditional Communications Media

During the period of 2001-2004, training of village and township telecenter staff were conducted every month in Wu'an and twice a year at the project central office in Beijing. Training modules included Web/Internet Search, Data Management, Telecenter Operation and limited agricultural techniques. Telecenter staff also posted questions on telecenter

⁹ Their monthly average mobile phone expenses cost 15 RMB or US\$1.88 (Menwangzhuang) and 25 RMB or US\$3.12 (Pushang).

operations through the Bulletin Board System (BBS) which linked all MoST-UNDP telecenters. Agricultural training was provided by Hebei Agricultural University via the Experts Online, which allows agricultural experts in Hebei to provide lectures using the telecenter network. The telecenter staff helped the farmers/children to seek information needed. When villagers discovered new agricultural information that required further interpretation, the staff sent a request to the county telecenter via the BBS system for Online Expert Advise.

Menwangzhuang farmers benefited from billboards set up in the community common space, carrying information downloaded from the Internet on proper procedures for the growing of chestnuts, walnuts, and green vegetables and other livelihood options/advise. The billboards were set up in the community common space where regular gatherings are held and can be easily seen by the villagers without visiting the telecenter. Despite the benefits of information accessed over the Internet, the research findings highlight the need for telecenter staff to be able to generate useful information from the Internet and translate this to appropriate media formats that would less alienate the poor and uneducated.

A limitation telecenters' usability was that its computers could only be used by those who can read and write pinyin and Chinese characters, making most farmers unable to use them on their own. It is in this case where the school-based telecenter in Menwangzhuang had an advantage, because it had the primary school students and teachers as ready market, who then translate accessed information to farmers and their families. Searching useful information was integrated into modules and school assignments, students were asked to solicit questions from their families which they then search with the help of teachers. Given the limitation of computers to reach illiterate villagers, the role of staff, teachers, and community infomediaries in bridging information with the farmers, in interpreting such information, in helping overcome their fear of technology, and helping design ways to put information into productive use becomes critical.

3.2.3 Access to Capital Assets.

Despite the availability of information, insufficient access to other sources of capital has hindered many farmer households from taking action (i.e. adopting new livelihood strategies or intensifying agricultural production). Further, the villagers noted that there were limited small loan facilities that can be tapped for venturing into agribusiness entrepreneurship or intensifying agricultural production. A farmer's wife in Menwangzhuang, for example, mentioned that although information on poultry and livestock raising had been shared through telecenter training, they did not have funds to invest on these. On the other hand, Li Yuexiang, telecenter staff in Pushang mentioned that the villagers benefited from marketing online. This was made possible through the village leadership's efforts to designate a pilot farmland where a special variety of tomatoes can be grown, facilitating significant and high quality production.

3.3 Telecenter's Role in Supporting Rural Livelihoods

The discussion below focuses on the perception of Menwangzhuang and Pushang households on the role of telecenters in helping increase their livelihood assets and in influencing them to adopt additional forms of livelihoods:

3.3.1 Human Capital

For the poorer farmers of Menwanzhuang, the telecenter project did not enable them to market their own produce, as they continued to rely on middlemen. This was due to their inability to produce in large quantities, lack of transportation facilities, and huge expenses to market the goods on their own. Nonetheless, market price information gathered from the

Internet gave the farmers some capacity to negotiate with the middlemen, which according to them also slightly increased their production income. Moreover, information increased the peasants' familiarity with the conditions of demand and supply so that they can adjust their products according to which is more in demand, and can sell at higher price. According to Yan Jinru (2006), one of Menwangzhuang villagers:

“We used to grow walnut trees that were very hard to maintain and produce and sold at low price. At the Center, we found out about a certain variety of walnuts that is easier to crack, and therefore more marketable. We started to grow this kind of walnut after learning about the info and gained more income (20RMB/jin/0.5kg), compared to the old variety which sold at only (6-7RMB/jin/0.5 kg). If we package the walnuts nicely and sell it to the market, it can even be sold at 40/jin”.

Information generated from the telecenter has also helped some farmer households try out new livelihoods and adopt them in combination with existing livelihoods. In Pushang and Menwangzhuang, the farmers mentioned of learning about raising livestock and poultry, grow bees and pigeons, plant green vegetables, or buy and sell “antiques” to complement their traditional livelihood strategies which originally focused on chestnut and walnut farming. New livelihood strategies learned were practiced during off-farm periods or by other household members during farming periods.

Further, information generated from the Internet helped intensify their agricultural livelihoods by discovering better varieties and other products to grow and learning how to better process and market their produce to increase profits. For example, after seeing Pushang's millet produce in the project website, a person from An'yang, Henan Province (within the UNDP-MoST telecenter network) helped Pushang villagers in the proper way of cleaning and processing millets. Li Zuoshang, a village leader in Pushang, mentioned that this helped them produce greater and better quality millets with a shorter processing time.

Another contribution of the telecenter was the promotion of e-literacy. The telecenter staff gained additional skills and tools that they were able to share with co-villagers or leverage on to find better earning technology jobs. The first telecenter staff in Menwangzhuang was hired by the China Network Communications (CNC) two years after serving in the project. Likewise, the center helped the users, especially teachers, children and the youth (who would otherwise have been deprived of this resource) to overcome the fear of technology and computers and benefit from basic computer training, word processing and Internet search.

3.3.2 Financial Capital

The villagers of Menwangzhuang declared an increase in average annual income from about 400 yuan in the year 2000 (before project implementation) to 900 yuan in the year 2005. Pushang villagers likewise declared an income increase from 800 yuan in the year 2000 to 2900 yuan in 2005. The villagers shared stories attributing this income increase with the telecenter. In many instances, these stories were also accompanied with estimated figures in income gains that are no longer emphasized in this study due to difficulty in proving causality given available resources. For example, the telecenter helped farmers find buyers of rare varieties of eggplants (“ziguang”) from other provinces, aided in the discovery of new variety of walnuts that are easier to grow and crack and therefore sell at a higher price, and helped them learn of the uses and cooking methods of rare plant and vegetable varieties found in the mountains that they were later on able to consume and sell. According to Sun Jiqin (2006) of Menwangzhuang:

“I sell wild vegetables in the supermarket in Handan. At the start, few people in the city knew how to cook wild vegetables. I checked the center for ways on how to cook the wild vegetable and possible health benefits. We introduced this information to the buyers in the city and told our village that they can also look for this vegetable to cook and sell. This vegetable has just been here in the mountains but before, we were afraid of eating it because it might be poisonous”.

In Pushang, information on market demand and price differences across seasons also helped them learn when to best sell their produce and when to buy agricultural input at better prices. Moreover, information on livestock/poultry raising, disease prevention methods, and on effective fodder ingredients from the Internet helped increase production output and reduce production risks.

3.3.3 Natural Capital

Natural capital assets are not static and may be enhanced or augmented when brought under human control that increases its productivity (Ellis, 2000: 32). The telecenter’s website promoted the Forest Zoology Landscape District of Wudang Mountain, which attracted four companies to develop local tourism in Wu’an. Some villagers mentioned of finding ways from the Internet for better developing ecotourism in the “Longevity Village” in Huoshui town, including how to market and package their produce to tourists for better profit, but argued the lack of financial capital to do so. As in the previous example, the Internet helped teach them how to use and cook a certain plant variety growing in the mountains that were of no use to them in the past.

3.3.4 Physical Capital

The telecenter facilitated the transfer of information between rural centers and cities and the mountain villages. It also widened farmers’ options for information sources and channels and complemented traditional forms of communication and information media. In Pushang, the telecenter helped reduce the cost and time of finding a buyer by posting the products available online, thereby creating additional markets. Further, the telecenter has helped the county government in reducing the cost of providing training through the use of the Expert Online Service. This online service enabled them to expand their reach to more communities and at lower costs despite geographic hindrances.

3.3.5 Social Capital

As a catalyst in the process of community development, the telecenter in Menwangzhuang and Pushang served as an additional common space for community youth and women, especially during the peak of telecenter operations (2002-2004). Although Internet content still did not have much information on available jobs in other villages, the youth gathering in the telecenter exchanged information on available employment opportunities and procedures in finding jobs in nearby villages, and the community/county’s major events. In Menwangzhuang, the telecenter has become an extension of the primary school classroom where students gather in the afternoon to work on school assignments. It also facilitated information exchange across villages in Hebei and with other pilot telecenter sites in Shaanxi, Henan, Anhui, and Chongqing.

4. DISCUSSION

4.1 Telecenter’s Varied Roles in Supporting the Livelihoods and Livelihood Assets of Rural Communities.

While the telecenter helped some villagers of Pushang find buyers for their produce, the same was not the case in Menwangzhuang, whose production was relatively less, and whose

products were more difficult to sell. The study shows that in a poorer village, marketing the produce online has no meaning and use for the farmers, but the telecenter helped in finding other forms of livelihood that can augment their existing livelihoods. As middlemen greatly influenced the selling of produce in Menwangzhuang, market price information gave the farmers some leverage with the middlemen, who used to dictate the prices that they simply accepted. The lack of information makes farmers vulnerable to exploitation by others and makes them unable to realize the full potential value of their produce. (i.e. selling produce immediately after harvest at low prices and buying inputs at high prices). Where rural farmers have more access to current information, they can communicate better, enabling them to organize themselves, exchange information, and develop strategies to achieve better and more stable prices.

Evidence gathered in the study shows that the rural poor combine their assets to improve their livelihoods and expand their asset base. For example, the telecenters studied built on existing social networks and physical capital in order to facilitate e-literacy and agricultural training, thereby increasing human capital. In Pushang, the available physical (i.e. identified pilot farmland), financial (i.e. money for purchasing new plant varieties, fertilizers) human (i.e. agricultural techniques), and social (i.e. farmer-relationships) capitals were combined to enable them to benefit from accessing telecenter offerings (such as electronic commerce). These support Bebbington's (1999) argument that while the delineation of capitals within the livelihood approaches may seem to imply *"(even if this is not the intent) a sort of impermeable barrier...yet much of the work on access to resources...xxx... suggests that this barrier is both permeable and movable"*.

4.2 ICT's Functional and Analytical Role.

The paper also validates the studies of Duncombe (2006) and Chapman et al. (2004) that ICTs can have both a functional and analytical role in poverty reduction. The functional role of ICTs covers the previous discussion on directly enhancing the poor's livelihood resources. As its analytical role on the other hand, the telecenters served as a tool for development workers (UNDP, MoST, local governments, and partner institutions) to maximize time, effort, and resources for bringing information, training and advise to rural villages that have enjoyed limited livelihood information and training assistance in the past. In the course of implementation, the project has helped these institutions to better understand the village's information needs and capabilities and learned how to deploy future telecenter initiatives to better benefit the poor. This information is crucial for sharing with other institutions in planning and implementing future poverty reduction interventions.

4.3 ICT's Role and Potential in Altering Dominant Rules, Relationships, and Power Structures.

According to De Haan and Zoomers (2005:27), "access to livelihood opportunities is governed by social relations, institutions and organizations, and that power is an important (and sometimes overlooked) explanatory variable." Drawing from De Haan and Zoomers (2005) and Bebbington's analysis (1999: 2039), it is of value to examine the ways in which community-based ICT interventions aid in changing dominant rules, social/power relationships, and processes that shape the structure for the control, distribution and transformation of resources in the community.

The telecenters were set-up based on the dominant relationships and power structures in the county and villages. The initial selection of villages was based on the prioritization of more developed rural areas over the poorer mountain areas. This was largely driven by already existing networks (between county and village officials) and the perception that

technology-related projects will be more successful if implemented in higher-income villages with experience in managing technology projects (despite the poverty reduction objective)¹⁰. The telecenters were also initially managed by village leaders and members or family/friends of the village council. However, the experience shows some possible alternatives towards changing these dominant relationships and processes. Over time, the telecenters were set-up in the poorer mountain villages. The villagers (regardless of their own or their family's position in the village council) who learned the use of the technology faster were tapped to man the centers and receive appropriate salary. Also, the telecenter became a venue for young and old, farmers and livestock owners, men and women, and more well-off and poorer members of the community to interact and learn together. Further, the villagers became more adept at negotiating with middlemen to bring prices to more reasonable levels. The county government, as admitted by the project leaders, became better informed of the actual poverty situation and livelihood conditions of the villagers covered in the project. This can help them in the future programming of interventions that hopefully can alter existing relationships and power structures within the village/county.

The telecenter system also provided a mechanism for bringing the communities and its products online to the attention of markets, governments, or to anyone who surfs the Internet. It served as a venue for the villagers to market themselves, their products and livelihoods, their tourist offerings, and their culture. Although seemingly negligible, this affords the villagers "a voice that can be heard at a distance", and if sustained, carry prospects for altering previous relationships, communication systems, and modes of learning that are usually provided 'top-down'. Within the telecenter network, villagers and farmers from the different pilot sites were able to share information, serve as each other's "experts", and learn from each other.

4.4 Dynamic Role of Information in Rural Communities

ICT investments in rural areas are often least prioritized because of the difficulty in deployment, perceived high investment costs, indirect developmental impact, and need for an extended period of time to reap actual benefits. However, the importance of information and communication investments is that once information is accessed, absorbed, and translated into knowledge, this knowledge can be stored, further developed, and passed on. Notwithstanding doubts on the sustainability of telecenters, livelihood information gained by the poor villagers after years of implementation is continually being applied, exchanged, and developed in relation to particular needs and contexts. Although the villagers no longer visit the centers as often as during the peak of project implementation, the billboards and printed materials on Internet-generated livelihood information that have been posted in common spaces and disseminated still remain. The computer training and educational assistance afforded to the staff and villagers, including the children, are also a crucial intangible investment that prepares them for further education and technology adoption in the future.

4.5 Combining New and Traditional Forms of Information and Communication Media

The study has shown that the poor households benefited from simple and cheaper technologies carrying useful livelihood information that locals can relate to and use with less difficulty (i.e. billboards set up in community common spaces carrying livelihood information downloaded from the Internet). This process of combining new and traditional information media and placing them in strategic locations was effective in making the information more accessible to the rural poor.

¹⁰ Menwangzhuang village (together with another village, Shangdian) was only selected as a project site after UNDP called the attention of the county government and Science and Technology Bureau of Wu'an that villages selected are actually not poor. (Wang-Dexiang 2005).

4.6 Planning for Telecenter Sustainability

The trainings provided to the telecenter staff and villagers have helped not only in searching needed information and putting such information into productive use, but in sustaining interest in a technological project that was initially alienating to the poor. However, interest of the villagers to visit the telecenter has dwindled as telecenter operations and training sessions became less regular and much more limited (i.e. after the UNDP/MoST Project has officially been completed). Further, as the villages now shoulder the cost of telecenter maintenance and telecenter usage remains free of charge, the cost and benefit of the telecenter to the village is now being weighed by the village leadership. It becomes a sustainability issue once telecenter facilities have reached optimum use and could no longer be repaired. Given plans to implement larger telecenter projects in poor areas of China, this study emphasizes the need to strengthen efforts to develop sustainable telecenter business models within the Chinese context.

4.7 Relevance of Needs/Poverty Assessments

There were high hopes that the rural villagers would benefit from price information and from being able to sell their goods online. However, as previously discussed, other conditions are necessary before farmers can be able to join e-marketplaces, and achieve any significant results (i.e. significant level of production, sufficient training and motivation on possible incentives for use, assistance in packaging goods, etc). Further, mobile phones have penetrated the rural villages and are now being considered by the households as the “cheapest and easiest form of communication.” Thus, more services and content should be developed using the mobile phone that will allow the villagers to improve their livelihood strategies. “Village mobile phones” may be integrated in the telecenter to service households that cannot subscribe to them. These raise the importance of conducting poverty and needs analysis of targeted villages and in designing relevant technologies prior to investment of ICT resources to ensure optimum utilization and maximum benefit from technology resources.

Based on key findings mentioned in the above discussions, below is a revised framework representing the relationships between the Wu’an telecenters and rural livelihoods.

5. CONCLUSION

Findings from the cases show that telecenters carry a huge potential for reducing poverty through its catalytic role in enhancing rural livelihoods. In Wu’an, the telecenter helped increase the rural poor’s access to more livelihood assets, aided in the intensification of their agricultural livelihoods and to some extent motivated rural households to combine different livelihood strategies to gain better income. While the intensity of the changes experienced cannot support the claims about the transformative roles or impact of telecenters on the rural poor, these imply some positive implications of Internet deployment on certain aspects of rural poverty. These implications extend not only to economic aspects (such as better earnings or production), but to human (such as e-literacy and farming techniques) and social (such as creation of venues for community integration and knowledge sharing) dimensions.

Still, telecenters are only tools for accessing information and knowledge and ICTs alone would not improve livelihoods. Community empowerment is not likely to result out of the mere deployment of telecenters.

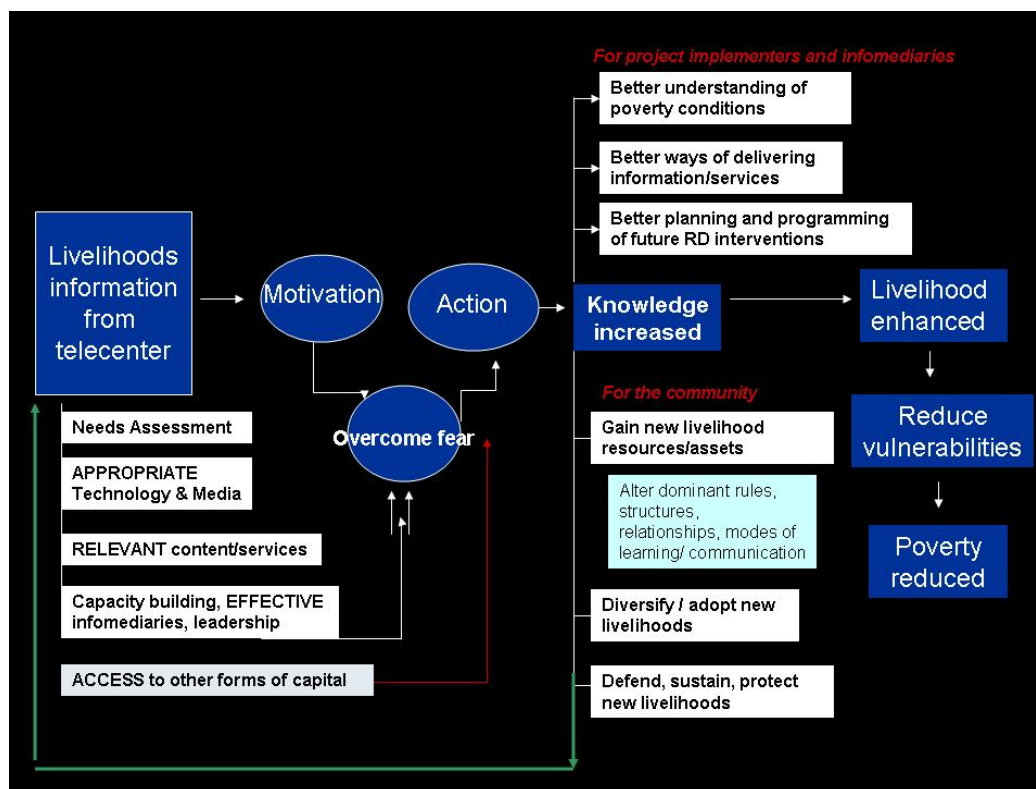


Fig 2 Revised Framework: Telecenter and Rural Livelihoods in China

Underpinning the provision of access to information is the support mechanism that motivates the villagers, help overcome the fear of technology and encourage them to diversify into other livelihoods, push them to take action on the new livelihood options available and later help them sustain and defend these new livelihoods. These support mechanisms include pro-active telecenter managers and staff, community leaders and early adopters. As observed in the case studies, 'infomediaries' play a critical role from encouraging the community to use the centers and find needed information, to enjoining the villagers to take action on new livelihood information. Their role is relevant especially in ensuring that the community puts the information and services transmitted from telecenters into productive use. Thus, capacity building for telecenter managers and infomediaries must be given priority in future telecenter deployment. Another critical support mechanism for livelihood diversification is access to other sources of capital, which helps actualize livelihood ideas generated from the information centers. Finally, for those that were able to diversify and adopt other livelihood options, continuous training is critical so that they can sustain and defend their new livelihoods. Further and longer-term research may be done to study the conditions that help rural households sustain and defend their diversified livelihoods.

Of critical relevance was the observed role of telecenters, albeit minimal, in both maintaining and altering dominant relationships, community processes, and power structures that affect the rural poor's access to livelihood resources or their capability to construct diversified livelihoods. The telecenter has given Wu'an's rural poor villages not only greater access to needed information sources, but venues for representing themselves, their conditions, and concerns that governments and fellow villages can learn from and become the basis for interaction, action, and possibly alteration of existing dominant relationships, processes, and structures.

Given the unbalanced rural economic and infrastructure development in China, and the way rural areas lag behind urban areas in terms of access to information and services, it is of value to sustain and expand such pilot telecenter efforts. There is a need to strengthen the deployment of information infrastructure to reach the poorest and remotest areas, the development of relevant content attuned to the needs of the specific communities, and basic skills development through better education facilities and capacity building mechanisms for future technology adoption.

Finally, ICT interventions that target rural poverty reduction would work best if they are integrated within a wider poverty reduction agenda. Telecenters will be most beneficial if it comes with access to other livelihood resources and assets such as financial credit, education, and capacity building, electrification, roads and other basic services that can improve the poor's living standards, sustain their escape from poverty, and make them self-dependent.

6. ACKNOWLEDGEMENTS

The author expresses sincere appreciation to the Asian Scholarship Foundation (for the funding support), Institute of Sociology and Anthropology of Peking University (Host Institute for this project), and the China Ministry of Science and Technology and the Wu'an Science and Technology Bureau (for helping facilitate the field visits). Special thanks to Dr. Lourdes Salvador and Prof. Ma Rong for the research guidance and to the Wu'an village leaders, telecenter staff and villagers for generously accommodating interview and survey requests. Appreciation to Professors Gao Binzhong, Wang DeHai, Wang Haimin, Liu Yonggong, Zhao Xudong, Sheng Rong, Wang Wensheng, Sun Sufen, UNDP's Daniel Wang-Dexiang, and Manolo Lopez, for sharing their wealth of rural development knowledge and extending relevant research materials. Zhao Song, Cai Ying, Yin Shurong and Tang Xiaochun provided valuable research assistance, translation, and interpretation services for this project.

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