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**Conference Paper**

## Seeking the Best Practices in rural agricultural informatization: Evidence from China's Sichuan Province

19th Biennial Conference of the International Telecommunications Society (ITS): "Moving Forward with Future Technologies: Opening a Platform for All", Bangkok, Thailand, 18th-21th November 2012

**Provided in Cooperation with:**

International Telecommunications Society (ITS)

*Suggested Citation:* Liu, Chun (2012) : Seeking the Best Practices in rural agricultural informatization: Evidence from China's Sichuan Province, 19th Biennial Conference of the International Telecommunications Society (ITS): "Moving Forward with Future Technologies: Opening a Platform for All", Bangkok, Thailand, 18th-21th November 2012, International Telecommunications Society (ITS), Calgary

This Version is available at:

<https://hdl.handle.net/10419/72547>

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# **The 19th ITS Biennial Conference 2012**

## **“Moving Forward with Future Technologies: Opening a Platform for All”**

18 - 21 November 2012, Thailand

**Seeking the “Best Practices” in Rural Agricultural Informatization:  
Evidence from China’s Sichuan Province**

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# Seeking the “Best Practices” in Rural Agricultural Informatization: Evidence from China’s Sichuan Province

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## Abstract

“Informatization,” a policy of integrated telecommunications development, is regarded as one of the driving forces behind the Chinese government’s “new socialist countryside” program. Various national and provincial programs have been initiated to connect the agricultural communities to the information highway. Most of the existing studies are conducted at the national level, which largely neglects the fact that China’s unique central-provincial-local institutional arrangement makes the provincial/local government not only the implementers of center-initiated projects but also the initiators of informatization programs specific to their territory. This paper studies Sichuan province because its geographic and economic features make it an ideal site. Moreover, Sichuan probably has the widest variety of agricultural informatization programs among all the provinces in China because of the relief efforts after the 2008 Wenchuan earthquake by various entities. It is now imperative to critically revisit those programs to find out their status and identify the factors for both their successes and failures. This paper aims to complement the existing rural informatization research in China with a comprehensive provincial/local-level analysis, using an analytical framework that evaluates the performance and sustainability of major ongoing agricultural informatization programs. This paper will identify the best practices for rural development in other countries.

## Introduction

Governments, businesses and other interested parties such as NGOs (non-government organizations) have taken various actions to bridge the digital divide, including community telecenters (Gamage & Halpin, 2007; Shariful & Nazmul, 2009), networked kiosks (Sattar, 2007), low-cost computing (James, 2003), local rural initiatives (Parker, 2000), and webpage building (Akca, Sayili, & Esengun, 2007). Some countries, particularly those in the Asia-Pacific region such as India (Rao, 2005), China (Xia, 2010; Xia & Lu, 2008), Korea (Park, 2002) and Japan (Wang, 1994), have made national plans.

This study is funded by the Pacific Telecommunications Council. Sichuan province was chosen because Sichuan’s geographic and economic features make it an ideal site to study agricultural informatization. The province lies in the Sichuan basin and is surrounded by the Himalayas to the west, Qinling range to the north, and mountainous areas of Yunnan to the south. Sichuan has historically been known as the “Province of Abundance.” It is one of the major agricultural production bases of China. However, the small Chengdu plain (accounting for 6.6% of Sichuan’s land area), which is located at the center of the Sichuan basin, accounted for 49.7% of Sichuan’s GDP in 2008, according to the latest statistics.<sup>1</sup> In 2008, 75% of the total population was agricultural.<sup>2</sup> It is both geographically difficult and economically expensive to extend the information infrastructure to rural areas in Sichuan. However,

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<sup>1</sup> See [http://www.sc.xinhua.org/service/zw/2009-03/09/content\\_15897246.htm](http://www.sc.xinhua.org/service/zw/2009-03/09/content_15897246.htm).

<sup>2</sup> See [www.sc.stats.gov.cn/zxtjxx/200903/t20090327\\_87249.html](http://www.sc.stats.gov.cn/zxtjxx/200903/t20090327_87249.html).

surprisingly, the agricultural informatization service in Sichuan has gained some national attention. For example, both China Telecom and China Unicom's Sichuan branches were chosen as the "pilot" or "model" agricultural informatization sites by their parent companies. Does Sichuan demonstrate an exemplary model for other provinces?

## Literature Review

The urban-rural divide was found to be the outstanding characteristic of Chinese inequality (Knight & Song, 1999). In its eleventh five-year plan (covering 2006-2011), the Chinese government identified agricultural informatization as the key to achieving nationwide growth and improving people's capacity to participate in new economic domains (Hanna, Qiang, Bhavnani, Kimura, & Sudan, 2009, p. 3).

Interestingly, there has been no definition of the term "agricultural informatization" in the Chinese government's official policy documents. The history of China's agricultural informatization can be traced back as far as the 1994 launch of the National Informatization Committee's Golden Agriculture project, which aimed to build a nationwide distributed agricultural database. However, the term first appeared in a government document in 2006, as one of several national initiatives to build the new socialist countryside. It was addressed in each subsequent year's No. 1 policy document (Central Committee of the Chinese Communist Party & State Council, 2006, 2007, 2008, 2009, 2010). In each document, the government described the overall objective and general initiatives for that year's agricultural informatization. Chinese scholars have not reached a consensus on the definition of agricultural informatization. Xu and Zhu (2004) found four definitions for agricultural informatization, while Li (2009), the former director of the EU-China Center for Information & Communication Technologies at China's Agriculture University, told a reporter in an interview that his research revealed seven. Zhan, Zhang and Yang (2004) gave a generalized definition of agricultural informatization as a process in which modern information technologies and information resources are widely implemented in all fields of agriculture and the rural economy to create an advanced agricultural information industry and to promote the development of agriculture, the rural economy and society (Zhan, et al., 2004).

Existing research on China's agricultural informatization is fragmented and exploratory. The World Bank published a working paper in which it identified major national initiatives, challenges and policy recommendations for China's agricultural informatization (Hanna, et al., 2009). Similarly, a recent article in *Government Information Quarterly* by Xia (2010) found that China's rural informatization program was fragmented under a powerful ideological direction that had led to regulatory confusion. Other studies in English have been primarily concerned with connectivity, particularly universal telephone service (Harwit, 2004a; Xia & Lu, 2008). In the Chinese literature, on the other hand, most of the studies on agricultural informatization have emphasized content issues (Gu, 2006; Yin, 2007; Zhong & Xu, 2006; Zhu, Chen, Chen, & Yin, 2007).

A brief review of the existing literature reveals that connectivity and content are two essential and correlated issues in effective agricultural informatization. Connectivity concerns information delivery systems.<sup>3</sup> Content deals with information handling systems, including the collecting, processing, packaging and presenting of agricultural information to an audience. However, most prior research, particularly in

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<sup>3</sup> Or universal service.

China, has treated these two issues independently. The lack of a holistic theoretical framework results from the real-world fragmentation of this sector, in which different players have played different roles in agricultural informatization. Providing connectivity was the responsibility of telephone carriers, while content was primarily controlled and handled by the government. However, as the major Chinese telecommunications carriers have transformed themselves from traditional common carriers to integrated information services providers, they have started to offer informatization services in rural markets. Concurrently, the government began to build networks and distribute agricultural information to the rural community as a public service. The once-separated connectivity and content are now often combined and offered together. The convergence of the two Cs has made it possible and necessary to propose a new analytical framework to study the recent development of China's agricultural informatization.

Internationally, At least half of the existing research has telecenters as the primary subject. Telecenters are based on the (somewhat contentious) premise that *connectivity* (a technical construct) as well as direct *access* (a more economic, social, and psychological construct) to information will lead to empowerment, capacity building, and, thereby, "development". A telecenter usually provides connectivity and access to information via a range of information and communication technologies including phone, fax, computers, and the Internet. Research work on telecenters in development has tended to cluster around three key issues: sustainability, impact, and best practice. In terms of sustainability, telecenters model often struggles for the continuing maintenance cost, has difficulty in achieving social support given that the local community may identify other priorities to information, and deals with uncertain government policies and regulations. Findings are mixed but lean towards conclusions that public access venues are not fulfilling their potential in achieving self-sustainability, reaching disadvantaged populations and bringing about noticeable socio-economic change. As a result, a low proportion of public access venues have achieved sustainability and there is no agreement on one best model<sup>4</sup>.

## **Agricultural Informatization in Sichuan**

### **Universal Service Overview**

A half a century old famous slogan "upstairs and downstairs; electric lights and telephone" portrayed that a residential phone was central to the vision of good life that the new Chinese socialist regime had to offer to its people after the Party came into power in 1949 (Xia & Lu, 2005; Zhao, 2007). However, until 2000, when the Telecommunications Regulations of China was promulgated, the Chinese policy literature had never explicitly depicted the concept of "universal service" and a nationally accessible telecommunications infrastructure was simply assumed to be the objective (Zhao, 2007). Unfortunately, telecommunications developed extremely slowly and was operated in a semi-military and highly centralized manner from 1949 until 1978. Having a household phone line was remained a political privilege and a symbol of social status during this period (Pitt, Levine, & Yan, 1996). Rediscovered of its potential of being the principle engine for China's leapfrog development, telecommunications was given the highest priority in the late 1980s and its exponential growth had made itself "a miracle on top of a miracle" (Lu & Wong, 2003, p. 2). However, this development and the accompanied neo-liberal type of

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<sup>4</sup> For a comprehensive literature review, see Sey (2008) at <http://library.globalimpactstudy.org/sites/default/files/docs/CIS-WorkingPaperNo6.pdf>

industrial restructuring did not necessarily lead to a national accessible and affordable telecommunications network. On the contrary, accelerated system expansion and transformation and the reconfiguration of institutional forces in and around the system since middle 1990s have posed more challenges to service provisions in rural areas (Harwit, 2004b; Xia & Lu, 2005). It was argued that the whole decade of restructuring and commercialization of China's telecommunications has in fact worsen the uneven development, and worse still, this process was designed to be so (Zhao, 2007). By the end of 2000, only 82.9% of administrative villages were connected to the public phone network, an approximately 20% short of the stated target in the 9<sup>th</sup> Five-Year Plan (MII, 2001b). On the contrary, all the other major industrial indicators such as optical fiber capacities, the number of mobile phone and fixed line phone subscribers, and revenue growth went far beyond the state's planned targets (Lu & Wong, 2003, pp. 4-6).

In its 10<sup>th</sup> Five-Year Plan (2001-2005), the MII set the village access rate at 95%, somewhat embarrassingly lower than the 9<sup>th</sup> Five-Year Plan (MII, 2001a). It was found that, in the early 2000s, there was a growing policy discourse on "universal service" and its means of implementation, created by a mix of broad political economic and social developments, domestic and international discourses, as well as the specific business interests of China Telecom, which was then prohibited from the lucrative mobile business and eagerly seeking new business opportunities (Zhao, 2007). Universal service was also written into China's first administrative law titled Telecommunications Regulations of China. Article 44 of the Regulations principally stated that telecommunications carriers should fulfill their obligations of providing universal service in accordance with the State regulations and the MII may specify the universal service requirements by designation or auction. However, it did not specify any solid policy objectives and support mechanisms. The pursuit of universal service in this period should be situated in the general background of the Chinese government's effort to address the negative consequences of the uneven development. Although China's economic growth has been significant for the past 20 years, ranking third in the world in terms of Gross Domestic Product (GDP) in 2008, disparities between rural and urban areas had broadened seriously (Knight & Song, 1999). Recognizing the negative impact of rural-urban divides on social harmony and China's long-term development, after President Hu and Premier Wen took office in 2002, the Party vowed to develop rural areas into the so-called new socialist countryside<sup>5</sup>. Within this context, universal service has been regarded as one of the concrete measures the telecommunications industry should take to actualize the Party's socialist new countryside campaign (MII, 2004). It was the MII's legitimate requirement to place the universal service on its development policy agenda (Zhao, 2007). However, since the MII failed to gain support from both the central government and the industry to finance its proposed western-style universal service funds, it chose to resort to the more familiar administrative means and began to devise a top-down plan for the expansion of rural telecommunications network in 2004, when there left only 2 years to go to connect the remaining over 40,000 unconnected administrative villages in order to fulfill its target set in the 10<sup>th</sup> Five-Year Plan (Zhao, 2007). In the tentative plan, although the MII insisted stating that establishing a compensation mechanism was the fundamental and long-term solution for China's universal service program, it made a politically determined declaration that the

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<sup>5</sup> In China's political culture, the number 1 implies importance. The Party first issued five consecutive No.1 policy documents on agriculture sector since 1982. After 8 years' ignorance, since 2004, the Party has promulgated seven No. 1 policy documents on rural development successively, which marked a significant switch in the Party's strategy from deliberate uneven development to a balanced one.

“Telephone in Every Village” should still carry on without any compensation (MII, 2004).

Under the Telephone in Every Village, the MII distributed the tasks among the country’s six state-owned carriers, based on their respective revenues, profits, and the geographical locations of their networks. There should be at least two phones installed in every administrative village, one of which must be a public phone, which tariff should not be higher than that for a regular fixed phone. While the MII was responsible for the program’s overall planning and supervision, its provincial branches, as well as carriers, were encouraged to lobby financial aid and other preferential policies from local governments. To some extent, “Telephone in Every Village” was one of the many informatization programs that were largely a provincial endeavor under the ideological direction of the central government (Liu, 2012). The only incentive mentioned for carriers was spiritual recognition if successfully accomplishing the assigned task according to the plan (MII, 2004). As a program endowed with political significance, the Telephone in Every Village project had been quite a success. The 2004-005 campaign connected roughly 52,304 administrative villages to basic telephone service, and the penetration rate reached 97.1% exceeding the targeted objective of 95%.

Inspired by the successive experience, while continuing to connect administrative villages, the MII enriched the Telephone in Every Village in two perspectives beginning in 2006. On the access side, it would work with the local government to extend the telephone network further to natural villages in selected areas of Hunan and Jiangxi provinces. On the more complex applications side, it called for the 4 major carriers to initiate informatization services, including both broadband access and agricultural content services in selected areas (MII, 2006). In 2007, the MII promulgated its 11<sup>th</sup> Five-Year Plan for rural universal service program, according to which, all the administrative villages should be connected and the emphasis would switch to connect natural villages (MII, 2007). In addition, the MII seemed to have persuaded the central government to allocate a special funding from the state’s treasury to alleviate some of the maintenance cost the operation of telephone network in rural areas (MOF, 2006)<sup>6</sup>.

2007 concluded the first stage of Telephone in Every Village project with over 99.5 percent of administrative villages connected. In its 2008 order, the MII officially declared that telephone to every administrative village had achieved all the planned targets and it was time to extend the network to natural villages (MII, 2008). In addition to the plain telephone service, the MII also planned to connect 95% of townships with broadband and encouraged the carriers to continue developing informatization services (MII, 2008). In 2009, the MIIT<sup>7</sup> launched an additional layer of service to its Telephone in Every Village program, namely Information to Countryside, which was summarized as a Four One program, that is, one information station (website) and one information database for every township and one information collection point and one online page for every administrative village . The MIIT selected 10,000 townships as the pilot sites (MIIT, 2009). In 2010, the MIIT vowed to connect 100% of all the administrative villages with the telephone service and enable 100% of all the townships to connect to the internet. In addition, the target of telephone penetration of natural village was set at 94% (MIIT, 2010).

In April 2011, the MIIT hosted a ceremony declaring the complete accomplishment of all the targets sets in the 11<sup>th</sup> Five Year Plan. The latest statistics

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<sup>6</sup> The exact amount of funding allocated has never been made available to the public. It is explicitly stated that this funds should not be used for network construction.

<sup>7</sup> In 2008, the MII merged into the new Ministry of Industry and Information Technologies (MIIT).

from the MIIT showed that, by the end of November 2011, 100% of administrative village and 94.5% of natural village had been connected to telephone network, 100% of townships and 95% of administrative villages had internet access (MIIT, 2011b). Also in 2011, China began to implement its 12<sup>th</sup> Five-Year Plan. Reportedly, the main goals of the MIIT's universal service plan include Reportedly, the main goals of the ministry's plan include increasing the administrative village broadband penetration to 95%, connecting all the natural villages with basic telephone, extending Four One program nationwide, and establishing the universal service compensation mechanism (MIIT, 2011a).

To summarize, initially unenthusiastic about universal telephone service, China in the 1990s began to rapidly expand the territorial reach of their telecommunications network. The overall objective was to achieve balanced development between rural and urban areas. China has neglected demographic expansion, seeking instead to implement layered expansion by progressively adding broadband access, and also informatization services.

### **Business Model of China Telecom Sichuan: A Close Look**

In the case of Sichuan, over 99% of administrative villages and 88.6% of natural villages were connected by the end of 2009.<sup>8</sup> Sichuan had also connected 93% of its townships with broadband networks by 2009. The remaining unconnected administrative villages are located in the remote and mountainous areas, 90% of which have no reliable electrical service.

In 2008, China Telecom initiated a province-wide project called “Information Village” with the Sichuan provincial government. The project planned to build approximately ten thousand basic, one thousand standard and one hundred advanced information villages. Tab. 1 presents the standard for the three levels of the “Information Village.” The “Information Village” only touched the connectivity side of agricultural informatization. In its 2009 order, the MIIT specifically directed China Telecom to emphasize the provision of information service stations and agricultural content to extend information, service and equipment to agricultural communities (MIIT, 2009).

Tab. 1. Standard of information village.

	Basic	Standard	Advanced
Household Telephone Penetration	30%	40% ;	50%
Broadband Penetration	n/a	At least one subscriber	5% ;
Household Value-added Services (such as caller ID) Penetration	10%	30%	50%
Information Station (at least one computer installed)	Yes	Yes, with one local supporting staff	Yes, with one local supporting staff and subscribing to at least one informatization service.

Source: Sichuan provincial informatization office, available at [http://www.sc.gov.cn/zwgk/gggs/xx/200804/t20080425\\_271973.shtml](http://www.sc.gov.cn/zwgk/gggs/xx/200804/t20080425_271973.shtml) (in Chinese)

<sup>8</sup> Data retrieved from the news brief of Sichuan Communications Administration, see [http://www.agri.gov.cn/ztzl/xxgzjyjil/gdjyjil/t20091208\\_1396433.htm](http://www.agri.gov.cn/ztzl/xxgzjyjil/gdjyjil/t20091208_1396433.htm).

In 2009, China Telecom began to offer two types of agricultural informatization services in Sichuan, one for business (including local government) and the other for residential customers, both under the brand name “Info Countryside (*Xin Xi Tian Yuan*) (IC).” For business customers, China Telecom provides an integrated informatization package, including regular phone service, website building and hosting service, and office automation service. For residential customers, China Telecom operates a portal website that subscribers can access through an internet-enabled computer or a regular television set with a set-top box.

The IC-capable TV is specifically designed for those rural customers who cannot afford computers and the monthly subscription to regular Internet services. The TV is connected to, but restricted within, China Telecom’s Info Countryside domain. Customers can view governmental, weather, market and agricultural information available on the Info Countryside’s portal site on their TV sets. Entertainment content, such as movies, online gaming and TV shows, are also available. The set-top box is often given out free in exchange for a one-year subscribership. The local government is able to post announcements and news to the server, which will then show up on the customer’s TV screen. Because the content can be navigated simply by the on-screen menu with a standard remote control, the TV user of Info Countryside service does not need any computer literacy.

Figure 1 demonstrates the division of work among the local government, China Telecom and rural communities. Although it is conventionally considered as business approach promoted by China Telecom, interestingly, the government has been posited at the center of this model.

Horizontally speaking, the local government forms alliance with the local China Telecom operating branches. The government envisions strategic goals for agricultural informatization, while China Telecom makes the action plan. As a matter of fact, because of the lack of expertise in engineering, the government depends on China Telecom for its input on some of the critical data, particularly the issue of network capacity. The local agricultural informatization policy resulted from the interactions between the local government and China Telecom reflects the compromise between the government and the business. This arrangement seems to be pragmatic in practice. For China Telecom, it integrates its business into the government informatization endeavor and, by doing so, maintains a good relationship with the government. In rare cases, the local government might allocate some limited funding to support its informatization program. However, according to the survey we have conducted with local authorities, those funding has been primarily as a monetary reward for those villages which rank top in the informatization program.

Vertically speaking, the local government is also the center of the informatization program by establishing a rewards-and-punishment tie with the rural villages. Village ranks the lowest in China’s political system. Although farmers are now free to elect their village leader, the local government still has significant influence in setting the agenda. And, more importantly, once elected, village leaders become members of the civil servant system. However, it must be pointed out, most of the informatization programs, particularly those without funding support, issued by the local government are directive, rather than binding, which implies, first, villages can choose not to carry on those projects; second, even if villages choose to do so, it might not pick China Telecom as the service provider if they can get a better deal from other companies. Interestingly, in reality, with a few exceptions, most of the villages have made the decision to coordinate with China Telecom. The economic reason is that China Telecom is still the sole wireline broadband provider in most rural areas. Politically speaking, village leaders also have the incentive to maintain a

good relationship with then upper government and choose the designated China Telecom according to the directive orders. There is another reason we had not expected before our field trips. Particularly in remote and poor areas, many people, including village leaders and farmers, still consider China Telecom as a government agency, despite the fact that China's telecommunications industry has been commercialized for over a decade. Thus, many of those villages take it for granted that China Telecom is the only service provider for informatization project.

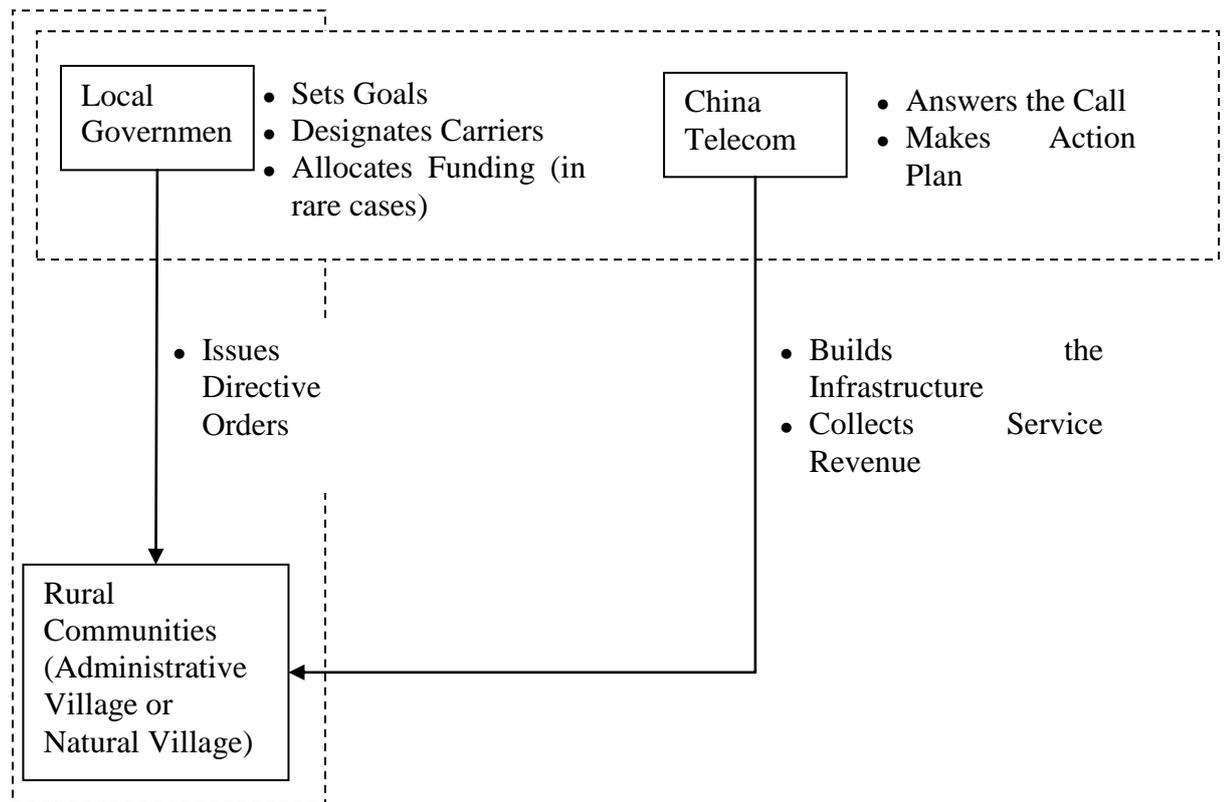


Fig.1. The Business Model of China Telecom's Informatization Program

The Info Countryside service moves a step further into the content side of agricultural informatization, compared to the Information Village project. However, China Telecom has limited capability in information collecting and handling. Provincially, China Telecom lacks the expertise and resources to gather quality agricultural information. Locally, every standard or advanced Information Village has at least one supporting local staff member to collect and upload local information to the Info Countryside network and provide training to the local residents. However, unlike the REIN model, the local staff for the Info Countryside are inexperienced volunteers, mostly young college graduates recruited by the government to work in the countryside temporarily.<sup>9</sup> These college graduates have sufficient information literacy to effectively retrieve information from the Internet. However, due to their limited local and agricultural knowledge because of their short time working there, the quality of the local information collected is questionable. In practice, the volunteering mode is often dysfunctional because most of the college graduates are withheld by the township government for routine government services. Thus, should a village need to post some information online, it often has to call a China Telecom's local representative.

<sup>9</sup> The volunteers will be given preference in graduate entrance and civil service examinations after their service in the countryside.

In addition to the limitation in content, the sustainability of connectivity is also at issue. As a political campaign, the “Telephone in Every Village” project has been quite a success. Like other projects sponsored by the Party, this project is endowed with political significance. Because all the major telecommunications carriers in China are state-owned enterprises, their management is government officials, and the success or failure of this project has a significant impact on their future political careers. As the center of the informatization program, the local government faces the similar dilemma. Compared to the GDP growth rate and other economic indicators, informatization is always given the lower priority on the agenda. As mentioned before, informatization program usually comes with no government funding support. Thus, informatization is considered more strategic and directive than mandatory and binding. The situation is worsened in the least developed rural regions where the local government has essentially no surplus in their budget to support the seemingly luxury informatization program.

In the long term, because those carriers are listed on the foreign and domestic stock markets, the mixed ownership requires them to be responsible not only to the government but also to the investors. The entrepreneurship and professionalism of business culture are in direct conflict with the Party’s political interest. In addition, one of the commercial motivations for the carriers to provide the agricultural informatization service is to recover the construction and maintenance costs of the “Telephone in Every Village” project and to gain a competitive advantage over their competitors. However, because the profit margin of the rural market is so low, it is common for carriers to withdraw from this sector when a more profitable one emerges. A recent example is China Telecom’s discharge of its Department of Rural Market in May 2009, when it got the long-awaited cellular license and mobilized most of its resources to build and market the CDMA2000 3G network in urban areas nationwide. Fig.2 provides a summary of the analysis of China Telecom’s IV service.

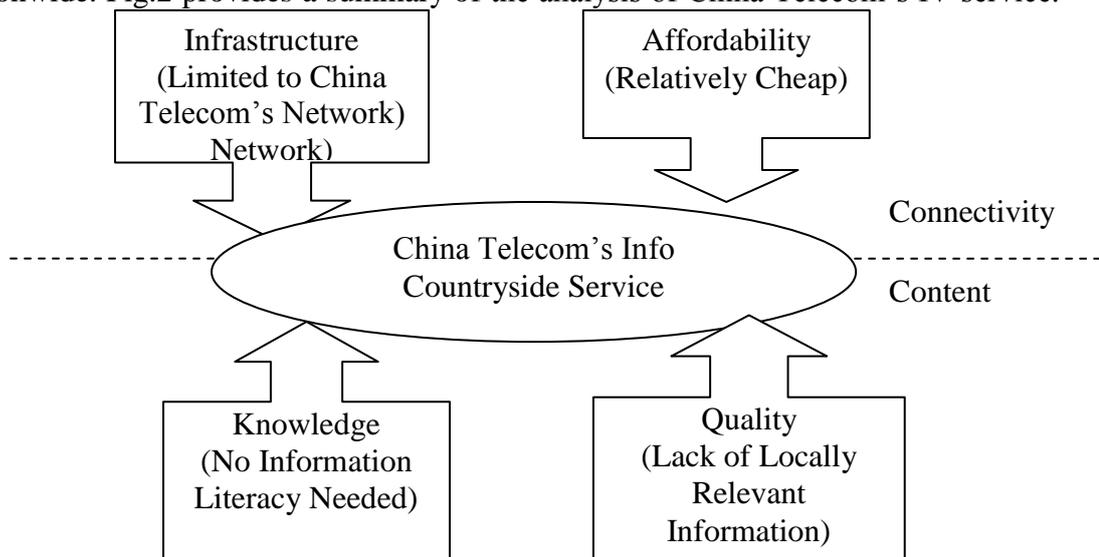


Fig.2. A summary of the analysis of the Info Countryside

## Other Models

### Government's REIN

The Sichuan provincial government's agricultural informatization program can be traced back to 2001, when the provincial People's Congress passed the "Outline of the tenth five-year plan for Sichuan's economic and social development (2001-2005)," in which the electronic and information industry was given the highest priority in the next five years. In particular, several objectives were set for agricultural informatization:

- Lower the price of telephone service in rural areas to a level comparable to that of urban areas;
- Connect 95% of townships with optical fiber;
- Develop basic agricultural informatization infrastructure and service system (Sichuan Provincial People's Congress, 2001).

Subsequently, the Sichuan Weather Service Bureau was selected by the Sichuan provincial government to build and operate the Rural Economic Information Network (REIN). Although other government agencies have set up their own agricultural informatization services, the REIN has been considered the most authoritative because it is directly organized by the Sichuan provincial government.

The REIN's position was further strengthened in the following years. In 2004, the provincial government issued an order requesting the local governments to input more resources, such as funding, human resources, etc., to the operation of the REIN (General Office and the Sichuan Provincial Government, 2004). The 2006 No. 1 policy document of Sichuan planned for the REIN to extend its service to cover 90% of rural areas (Sichuan Provincial Communist Party Committee & Sichuan Provincial Government, 2006). The REIN was also mentioned in the No. 1 policy documents of 2007 and 2008, which stated that it would be continuously improved (Sichuan Provincial Communist Party Committee & Sichuan Provincial Government, 2007, 2008). In 2009, a more specific task was assigned to the REIN when it was charged with standardizing the agricultural information (Sichuan Provincial Communist Party Committee & Sichuan Provincial Government, 2009). In the newest No. 1 document, released in 2010, the party and the government reiterated that they would continue to support the REIN (Sichuan Provincial Communist Party Committee & Sichuan Provincial Government, 2010).

The REIN is a cluster of networks that consist of one provincial center, 21 municipal centers, 188 county centers and 3380 service stations in villages and towns.<sup>10</sup> Its primary website (<http://www.scnjw.gov.cn/>) is designed to be a one-stop portal for Sichuan's rural communities. In addition to the regular government, business, technology and entertainment information, it even operates an online bookstore selling agriculture-related books. In 2009, the REIN ranked among the top 30 government-sponsored agricultural websites in China.<sup>11</sup>

As a government-sponsored service provider, the REIN is carefully equipped with a comprehensive information-collecting system that enables the REIN to provide both authoritative government and relevant local information. The REIN has a hierarchical organizational structure that includes both provincial and local government agriculture-related agencies. At the provincial level, the majority of the key government agencies are members of the REIN. The 20 members include the

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<sup>10</sup> See the REIN's "about us" page at <http://www.scqx.gov.cn/bmgk/zsdw/2008053002120285.html>.

<sup>11</sup> The contest was conducted jointly by China Economic Commerce Association, Internet Society of China and the Information Center of the Ministry of Agriculture.

Bureau of Information Industry, the Committee of Development and Planning, the Bureau of Finance, the Bureau of Agriculture, and the Research Institute of Agricultural Science. The REIN is ideally designed to include all agriculture-related government agencies. As the information integrator, the REIN has set up the internal information exchange mechanism among those government entities. At the local level, it is mandated that every township must appoint at least one information collector for the REIN. The information collector is responsible for distributing the REIN's information to the local communities and uploading local news and other information to the REIN. The REIN is carefully designed to include both authoritatively governmental information and locally relevant information.

However, the REIN avoids the connectivity issue. The primary, if not only, channel for the REIN to distribute the information is its website. To tackle the last-mile problem, it is not uncommon for some local REIN staff to print and post the REIN's information on the blackboard located in the local free market so that rural residents can read it during the weekly gathering (Zuo, 2006). The REIN also had a call center service, through which people could call the number (96999) and listen to the content they chose.<sup>12</sup>

In addition, with the abolishment of the agricultural tax in 1996 that was the primary revenue for the local township, the REIN's extensive information-collecting system was troubled by insufficient personnel and funding. The local governments, especially poor townships, have significantly reduced or even ceased their investment in the REIN's local operations (Zuo, 2006). Many of the REIN's local staff were poorly trained and paid (Zuo, 2006). Consequently, the REIN has faced difficulty in collecting high quality local information and distributing timely information to the general public. Without a sustainable funding resource for the REIN, it is likely to lose its comparative advantage. Fig. 3 provides a summary of the analysis of the REIN model using the analytical framework.

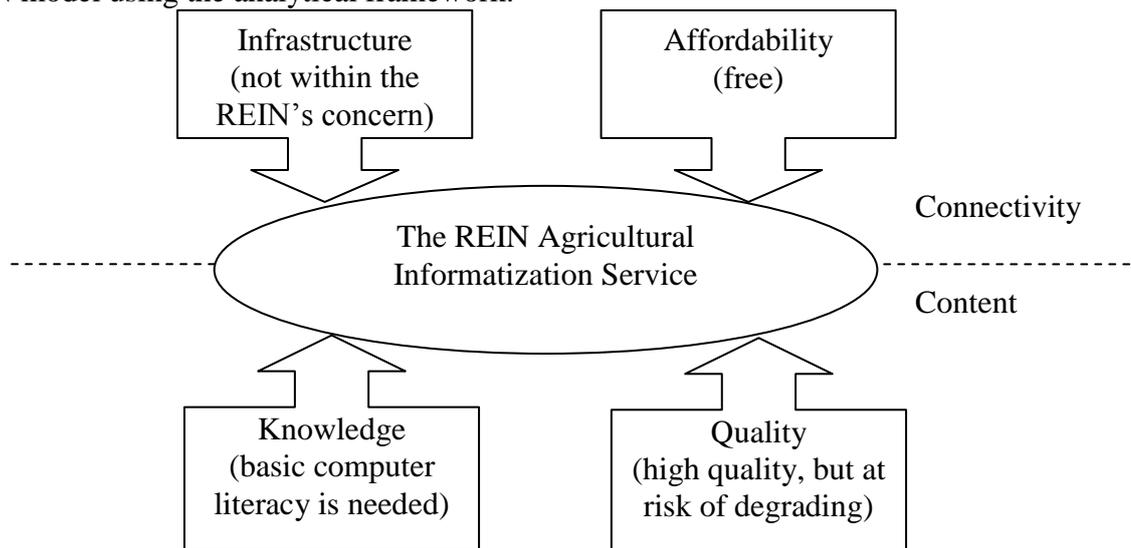


Fig. 3. A summary of the analysis of the REIN.

<sup>12</sup> The service itself is free. However, callers must pay per minute of the local call charge.

## Other Initiatives

The potential of the emerging non-government agricultural informatization initiatives should not be neglected. As this paper develops, new players are emerging in the field of ICT for development in Sichuan. Cisco has initiated a program called “Connecting Sichuan” that aims to help the government rebuild regional healthcare and education infrastructures that were severely damaged by the earthquake in May 2008.<sup>13</sup> Microsoft is supporting the MIIT to run pilot projects in Sichuan and other provinces by setting up Information Service Centers.<sup>14</sup> Intel has also extended its “iWorld” project to Sichuan by establishing 200 state-of-the-art “e-classrooms” and extending Intel’s education programs to schools across eight severely affected counties in the province.<sup>15</sup> The Sichuan Bureau of Commerce, together with Intel China and China Telecom Sichuan, developed a technology solution as part of the Thousand Villages project.<sup>16</sup> In this project, Intel provided low-cost and easily operated computer software, and China Telecom Sichuan was responsible for providing affordable broadband connections to local stores. In addition to the big names, the Digital Opportunity Trust, a Canadian non-government organization, is running two ICT-based educational programs in selected Sichuan cities.<sup>17</sup> These programs are sporadic, and it takes time to test their effects. However, they do provide alternative options for the government. The government should have an open and inclusive attitude and integrate the top-down government programs with bottom-up grassroots initiatives.

## Discussions and Concluding Remarks

Agricultural informatization is composed of two fundamental issues: connectivity and content. Both the commercial Info Countryside and the government sponsored REIN and seem to be strong on one side but weak on the other. This is not surprising, given the comparative advantages of their providers. The government, which controls a huge amount of agricultural information and has the ability to mobilize its many officials virtually everywhere in rural areas, lacks the experience and funding to build and maintain the physical network, while the carriers, who are naturally associated with connectivity, generally have no expertise in collecting and distributing high quality, locally relevant information.

The infrastructure is the prerequisite to agricultural informatization. Universal service, which aims to connect rural areas to the national communication network, has traditionally been considered the most important component of national information policy. What is debated is the scope, scale and funding mechanism of this policy. Both the REIN and the Info Countryside have addressed this issue. As a government project, the REIN focuses on the government’s internal informatization. It sets up hundreds of networked computer stations in almost every local government. More importantly, it formulates rules and regulations that mandate that the different levels of governments exchange information regularly. In a sense, the REIN serves more as an information integrator than a service provider. Info Countryside, with its preceding Info Village and Telephone in Every Village projects, focuses on the external

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<sup>13</sup> See: <http://www.cisco.com/web/about/citizenship/socio-economic/specialprograms/sichuan.html>.

<sup>14</sup> See: <http://www.microsoft.com/presspass/features/2007/dec07/12-19China.msp>.

<sup>15</sup> See: <http://www.intel.com/cd/corporate/csr/apac/eng/education/events/events30/421147.htm>.

<sup>16</sup> The project is a national initiative to encourage government-certified urban chain stores to expand into rural areas. The expectation is that those stores can serve as a hub that distributes both goods and information in rural areas.

<sup>17</sup> See: <http://www.dotrust.org/where-we-work/china>.

infrastructure, connecting the end users to the network. The REIN and the Info Countryside programs complement each other in terms of infrastructure development. However, because the two programs are operated independently without a coherent plan, the interface between the internal and external networks is poorly defined. The interconnection between the networks has become a bottleneck that prevents the effective flow of the REIN's agricultural information, most of which is restricted within the internal network, to the Info Countryside's public network.

Access to the infrastructure should be affordable to reach as many people as possible. Affordability is more pressing in agricultural communities where residents are usually poorer than their urban counterparts. Like other information, access to the agricultural informatization service requires two types of fees: a one-time purchase of equipment and a periodical subscription. As a government-sponsored project, there is no subscription needed to access the REIN's information. However, the REIN does not cover the end-user computing equipment cost. Thus, the circulation of the REIN's information is largely limited to local government agencies and those residents who already have computer and internet connections at home. The irony is that those networked residents are comparatively richer and better educated than other residents. Thus, the divide between the information haves and have-nots within agricultural communities is not narrowed, and it may be widened. One of the prominent characteristics of the Info Countryside is its ability to turn TV sets into computer screens, which, to some extent, solves the end-user equipment issue. Although the TV sets have no computing power, they enable the subscribers to browse the Internet with the help of low-cost set-top boxes. As a commercial offering, China Telecom has to recover the cost of set-top boxes from the monthly subscription fee. There are no data available on the profitability of the Info Countryside service. However, compared to more lucrative services such as mobile communications, the profit margin in rural markets is obviously much lower. For both the REIN and Info Countryside, insufficient funding and lack of a sustainable (or profitable) business model appear to be two common problems.

Both the REIN and Info Countryside require very basic computer literacy. Most of the content is presented in an easy-to-browse World Wide Web format. For those who have no computer literacy, the REIN offers two alternative ways to help users access the information, by telephone or through the local government. Although the information available from the offline access is limited, it offers the less educated and poorer agricultural residents an opportunity to access information that is usually unavailable within their local social networks. The Info Countryside's television-based system is another good example of utilizing existing widely available terminals to provide informatization services. The subscriber can easily navigate the system through the on-screen menu using the remote control.

Quality criteria measure the information's relevance to the recipients. Agricultural communities are usually isolated. Thus, localization is the key to providing quality information to the agricultural communities. As a government project, the REIN has taken advantage of China's gigantic and all-pervasive bureaucratic system. It has a dedicated team of information collectors at each hierarchy of the government system, which enables it to collect high quality, locally relevant information. At the same time, the regular information exchange mechanism is set up at the provincial level for the REIN to retrieve timely information from relevant government agencies. Essentially, agricultural informatization has become an integrated daily function of the Sichuan government. Similar to the REIN, the Info Countryside has established a province-wide information-collecting network. However, because the Info Countryside's local staff works on a volunteer basis, the

quality of the information collected is comparatively low. While both the REIN and the Info Countryside choose the same approach to collect and distribute locally relevant information, they also face the same issue of sustainability. Although it is helpful for the REIN to integrate informatization into the government's daily operations, when the government's priorities shift, informatization often gives way to other, more imperative tasks. This is particularly true when the local governments are required to bear the cost of informatization. Similarly, the volunteer-based Info Countryside's local operation is vulnerable to more lucrative businesses.

There are several lessons that can be drawn from the case of Sichuan. First, there is a lack of a clear vision or a coherent strategy. Although the government has realized the importance of information technologies in transforming and upgrading traditional agricultural economy, it has not yet designed a vision of the future, let alone a roadmap. A survey of government documents and academic literature reveals there is no consensus on the definition of the term "agricultural informatization." Consequently, different government agencies have designed agricultural informatization programs according to their own understanding and expertise. Admittedly, programs like the "Telephone in Every Village" and the REIN have dramatically closed the information gap between the rural and the urban. However, without a carefully designed, coherent strategy, limited resources are scattered among different government agencies. The inter-ministerial competition tends to encourage them to emphasize building the infrastructure while neglecting the collection, synthesis and distribution of information because the physical presence of the network or website could be more easily showcased as a political achievement. As we found in Sichuan, although they have successfully built the necessary infrastructure, both the REIN and the Info Countryside are losing their foothold in rural communities due to difficulty maintaining their local supporting teams.

Second, neither the government nor the business realm has provided a sustainable solution to agricultural informatization. A common problem of the REIN and the "Telephone in Every Village" project is their sole reliance on government money. The government-driven approach is conventionally described as concentrating resources and doing big things, which is thought to be one of China's comparative advantages over western countries. However, at issue is the sustainability of such an approach when the emphasis of the government moves to another "big thing." As an attempt to recover the huge cost of the "Telephone in Every Village" project, the Info Countryside service has not proved itself to be sustainable and impervious to other more lucrative business opportunities. Generally, due to the limited spending power of those living in the rural areas, it is not easy to find a profitable business model to fund agricultural informatization, nor is it feasible to simply put the burden on a single company or the government.

Agricultural informatization has been on the Chinese government's political agenda for over a decade. Numerous programs have been initiated at different levels of government. While significant progress has been made in some areas, arguably, few programs have satisfied both the connectivity and content requirements, as evidenced in Sichuan's case.

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