

7-2016

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### Recommended Citation

Liu, Chun (2016) "Building the Next Information Superhighway: A Critical Analysis of China's Recent National Broadband Plan," *Communications of the Association for Information Systems*: Vol. 39 , Article 10.

DOI: 10.17705/1CAIS.03910

Available at: <http://aisel.aisnet.org/cais/vol39/iss1/10>

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## Building the Next Information Superhighway: A Critical Analysis of China's Recent National Broadband Plan

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### Abstract:

Governments today have a strong interest in promoting the development of the next-generation broadband networks. Some 134 national broadband plans are now in place around the world, and China is no exception. On August 1, 2013, China's State Council officially announced the ambitious Broadband China Plan with which it aims to build a ubiquitous, fast, and advanced national broadband network before 2020. Will the Broadband China Plan lead to another leap forward? In this paper, I critically evaluate China's recent broadband policy. I argue that China's plan marks a major paradigm shift in China's information policy. For the first time, the country has formally recognized a broadband network as a strategic public facility and considered it as a necessity rather than an optional value-added telecommunications service. However, it remains a conventional supply-side industrial policy, and its effectiveness is highly uncertain.

**Keywords:** National Broadband Plan, China, Telecommunications Development, Public Utility Model, Information Superhighway.

This manuscript underwent editorial review. It was received 05/11/2015 and was with the authors for 4 months for 2 revisions. Robin Teigland served as Associate Editor.

## 1 Introduction

Governments today have a strong interest in promoting the development of the next generation broadband network. Some 134 national broadband plans are now in place around the world. According to a recent study by the International Telecommunications Union, a national strategy to increase broadband penetration is the most effective factor driving deployment (The Broadband Commission for Digital Development, 2013). China is no exception. On August 1, 2013, China's State Council officially announced the ambitious Broadband China Plan, which aims to build a ubiquitous, fast, and advanced national broadband network before 2020.

Traditionally, China's telecommunications development has been driven by investments from government-allied entities and featured a strong industrial policy, which arguably made the telecommunications sector a jewel in the crown of the socialist market economy, particularly in the 1990s. However, recent statistics show that Chinese telecommunications infrastructure development has already moved from the early jump-start stage to a more stable position. Will the Broadband China Plan lead to another leap forward? In this paper, I critically evaluate China's broadband plan.

## 2 Literature Review

In recent years, a growing number of studies have compared the broadband situation among different countries and found patterns that could explain the varying levels of broadband penetration. Most of the existing studies concern the impact of economic policies such as access regulations, whereas a much smaller branch of the literature addresses the impact of competition policies and direct government involvement in deploying new communication technologies (Briglauer, Frubing, & Vogelsang, 2015). Governments can play the role of an “enabler” or a “rule maker” in broadband development (Picot & Wernick, 2007). Depending on the extent to which governments are engaged in broadband deployment, one can roughly distinguish three types of government policies and regulatory strategies: soft-intervention strategies, medium-intervention strategies, and hard-intervention strategies (Cava-Ferreruela & Alabau-Muñoz, 2006). Overall, evidence from empirical findings exhibits a certain disunity on the government's role in broadband development (Belloc, Nicita, & Rossi, 2012; Cava-Ferreruela & Alabau-Muñoz, 2006; Falch, 2007; Picot & Wernick, 2007). Some argue that, although technical and economic parameters play the primary roles in the development of broadband services, public policy involvement is still worthwhile because it provides a clear and significant stimulus to broadband penetration (Belloc et al., 2012; Falch, 2007). Conversely, other works—including Montolio and Trillas (2013)—have found that indicators of national industrial policy constitute only a weakly positive determinant of broadband deployment and that different measures of centralization, which they call “regulatory federalism”, are either irrelevant or have a negative impact on broadband deployment.

Broadband forerunners such as Sweden, Finland, Japan, and Korea took a proactive interventionist approach when they began their broadband rollouts; these approaches featured specific missions, achievable goals, and policies designed to achieve success (Eskelinen, Frank, & Hirvonen, 2008; Frieden, 2005; Lau, Kim, & Atkin, 2005). Now, there seems to be another international trend of using taxpayers' money to promote development of a next-generation broadband network. Numerous countries have drafted various “plans” to drive next-generation network development. A recent report issued by the United Nation's Broadband Commission for Digital Development found that there were some 134 plans in force by mid-2013 and estimated that, on average, the introduction or adoption of a broadband plan was associated with 2.5 percent higher fixed broadband penetration and 7.4 percent higher mobile broadband penetration (The Broadband Commission for Digital Development, 2013). However, the motives and means of those plans vary significantly, and the sector contains different understandings of the state's role that range from motivator to enabler and operator. Some plans, represented by Australia, New Zealand and Singapore, focus on government investment and feature strong industrial policies (Beltrán, 2013; Cave & Martin, 2010). Other plans, represented by the US and Europe, focus on policy to create a framework for private investment with a limited range of subsidies on the supply side (Ruhle, Brusica, Kittl, & Ehrler, 2011). In the context of developing countries, studies have found that governments across the globe have, to various degrees, returned to playing a proactive role to help speed up broadband development (Calandro & Moyo, 2012; Galperin, Mariscal, & Viacens, 2013; Jain, 2014; Jayakar & Liu, 2014a; Shin & Jung, 2012).

Policy makers have adopted a wide range of policy instruments to stimulate broadband development. One can generally categorize these instruments into two types: supply side and demand side. The limited

empirical econometric evidence developed so far indicate that the effectiveness of those policy measures vary across countries and different stages of broadband development (Briglaauer et al., 2015). Although traditional supply-side industrial policies seem to generate a higher take-up rate and penetration of new technologies, many have criticized them for failing to consider social and cultural features in their policy designs (Dias, 2012; Shin & Jung, 2012; Shin & Kweon, 2011). In analyzing the EU's legacy of broadband policies, Preston and Cawley (2008) found that technology-centered policy frameworks and broadband strategies, which give privilege to supply-side infrastructure while neglecting the demand-side issues of applications, uses, and users, have been associated with large variations in the level of broadband rollout, adoption, and use across member states. In addition, while both supply- and demand-side policies have a positive effect on broadband diffusion at the initial stage of broadband take-up, only demand-side policies appear to generate a positive and increasing effect after broadband penetration reaches a certain degree (Belloc et al., 2012). Thus, governments should use both supply- and demand-side policy tools to stimulate broadband development (Falch, 2007). In addition, from an end user's perspective, governments should focus on the main potential adopters at each stage of broadband adoption and implement appropriate strategies rather than adopting one-size-fits-all strategies (Lin & Wu, 2013).

### 3 Overview of China's Broadband Plan

In March 2012, the phrase "Broadband China" first appeared in the Chinese Government's official documents. A notice from the National Development and Reform Commission (NRDC) general office and the Ministry of Industry and Information Technology (MIIT) general office on carrying out research on the "Broadband China" strategy declared that an inter-ministry working group had formed to draft a blueprint for China's national broadband strategy (Yu, 2011). The members of the working group included government officials from NDRC, MIIT, Ministry of Finance (MOF), Ministry of Science and Technology (MOST), Ministry of Housing and Urban-Rural Development (MOHUD), the State-owned Assets Supervision and Administration Commission (SASAC), State Administration of Taxation (SAT) and the State Administration of Radio, Film and Television (SARFT), senior managers from the major state-owned telecommunications carriers, and some academics. The above-mentioned notice did not provide any specific background: it simply stated that the NDRC and the MIIT would initiate the process in accordance with the instruction of the State Council's leadership.

In June 2012, shortly after the inter-ministry working group formed, the State Council issued a policy document titled "Certain Opinions of the State Council on Promoting Informatization Development and Practically Safeguarding Information Security", which listed the "Broadband China" program as one of the measures to raise China's informatization standards (State Council, 2012). While this policy document made only some general statements, it signified that "Broadband China" was at the top leadership's agenda and broadband development had transformed from a ministerial issue to a national one.

On August 1, 2013, the State Council officially announced the Broadband China Plan (hereafter "the plan"), which set numerical goals, created a technology roadmap and a development timetable, and listed key tasks and specific projects with the goal of building a ubiquitous, fast, and advanced national broadband network before 2020 (see Table 1 for the major objectives of the Plan) (State Council, 2013a).

The plan identified five key tasks: balanced development across different regions, network optimization and upgrading, the enrichment of broadband applications, the overall development of the industrial chain, and the enhancement of network security. Accordingly, the plan articulated seven projects including a broadband rural project, a network optimization project, a small-to-medium enterprise (SME) informatization model project, a model project to supply broadband for poor and special education institutions, a digital culture model project, a project to commercialize the key broadband technologies, and a status-monitoring and mapping project for the overall plan. In terms of policy measures, the plan stated that an inter-ministry coordination mechanism would be established to make major strategic decisions and relevant laws and regulations would be revised to optimize the institutional environment for broadband development. Moreover, it stated that fiscal support, special universal service funding, and tax deductions would be available.

**Table 1. Major Objectives of the Broadband China Plan (State Council, 2013a)**

Indicators			2013	2015	2020
Number of broadband users	Number of households with wireline broadband service (urban/rural)	Million	210(160/50)	270(200/100)	400(n/a, n/a)
	Number of 3G/4G Users	Million	330	450	1200
Penetration rate	Household wireline broadband penetration (urban/rural)	%	40(55/20)	50(65/30)	70(n/a, n/a)
	3G/4G penetration	%	25	32.5	85
Network capacity	Broadband connection speed in urban areas (in selected developed regions)	Mbps	20	20 (100)	50(1000)
	Broadband connection speed in rural areas	Mbps	4	4	12
	Number of fiber-ready households	Million	130	200	300
	Broadband penetration for administrative village	%	90	95	>98
	Percentage of households covered by advanced cable Internet	%	60	80	>95
Information use	Number of Internet users (rural users)	Million	700(180)	850(200)	1100
	Volume of trading online	Trillion Yuan	10	18	n/a

One week after the plan's release, the State Council released yet another policy guideline titled "Several Opinions of the State Council on Promoting Information Consumption to Expand Domestic Demand" (hereinafter "the opinions"), which focused on boosting domestic information consumption (State Council, 2013b). According to the opinions, the Chinese Government wanted to boost public and household spending on information products and services to 3.2 trillion RMB and targeted the transaction volume of China's e-commerce platforms to become 18 trillion RMB by 2015, which, at the time, involved a greater than 20 percent annual growth factor (State Council, 2013b). While the plan emphasized infrastructure, the opinions elaborate on applications. Thus, to some extent, the plan and the opinions seem to complement each other.

From reading the texts, the Plan and the Opinions are directive guidelines rather than implementable programs. Even the specific programs proposed in the Plan only mentioned the objectives and contained no actionable details. However, for those who are not familiar with China's bureaucratic system, this lack of enforceability is not uncommon because in Chinese political custom, ministries and provincial governments are expected to issue respective follow-up implementation plans to achieve the goals set by the State Council (see Table 2 on the next page for the subsequent follow-up ministerial policies).

## 4 Critique of the Broadband China Plan

After years of rapid development, China has become the dominant figure in wireline broadband installations in the world. However, its growth rate has slowed down recently, which might imply that some degree of saturation has been reached in terms of broadband adoption, particularly in urban areas where broadband access is ubiquitously available. Will the Broadband China Plan spur another round of growth? In this section, I critically evaluate China's recent broadband policies.

### 4.1 An Unbalanced Supply-Side Approach

None of the seven planned projects in the plan directly target broadband consumers. Similarly, the approach the opinions adopts to boost information consumption is to increase the volume of useful information and create a conducive environment for consumers to access that information. The plan and opinions omit common demand-side policies, such as subsidies to low-income and other disadvantaged populations, digital literacy training, and so forth. By implementing the plan and the opinions, the Chinese Government aims to stimulate/create the demand for broadband service rather than to empower end users. In this sense, China broadband plan is largely a conventional supply-side industrial policy. Nevertheless, there are some noteworthy new features among China's plans.

Table 2. Follow-up Policies

Based on	Issued by	Title	Effective date	Summary
The plan	MIIT	Opinions on Launching the 2013 Broadband China Campaign	04/02/2013	General policy guidelines for Broadband China 2013
	MIIT	Opinions on Launching the 2014 Broadband China Campaign	04/30/2014	General policy guidelines for Broadband China 2014
	NDRC	Notice of the NDRC General Office and the MIIT General Office on Implementing LED and Broadband Network Equipment Research and Industrializing Special Program	04/25/2014	Research grants for broadband network equipment development
	MOHURD	Notice of the Ministry of Housing and Urban-Rural Development and Ministry of Industry of Information Technology on Carrying Out the FTTH National Standards	03/11/2013	Implementation plan for the new national standards on FTTH
	Ministry of Education (MOE)	Notice of the Collecting the Information on the Current Status and Future Implementation Plan for "Broadband to Every School" Project	05/09/2013	Subsidy for selected compulsory education schools to develop courseware based on broadband
	MIIT	Notice of the NDRC General Office and the MIIT General Office on the Application for the "Broadband China" Demonstration City (City Cluster)	01/08/2014	Setting standards for a "Broadband China" Demonstration City (City Cluster)
	NDRC	Notice of the Implementation of "Broadband Countryside" Pilot Project (Phrase 1)	06/10/2014	Subsidy for rural broadband buildup (a total of 100 counties in in 5 western provinces will be selected.)
The opinions	NDRC	Notice of the Implementation of "Information for the Improvement of People's Livelihood" Projects	01/09/2014	Subsidy for the selected cities (80 cities are chosen later) to utilize broadband technology to improve government service efficiency
	NDRC	Notice of the Implementation of Mobile Banking Demonstration Project	05/19/2014	To organize several demonstration projects in mobile banking (No funding support available).
	NDRC	Notice of the Starting of the National E-Commerce Demonstration City Application	09/13/2013	Subsidy for the selected cities (30 cities are chosen later) to develop the e-commerce sector
	NDRC	Notice of the Implementation of Telemedicine Demonstration Project	03/11/2014	Subsidy for the telemedicine demonstration projects in selected hospitals in western provinces
	NDRC	Notice of the Implementation of E-Invoice and E-Accounting Demonstration Projects	12/16/2013	Subsidy for e-accounting demonstration projects in selected cities
	NDRC	Notice of the Implementation of National Internet-of-Things Major Demonstration Projects	10/31/2013	Special grant for Internet of things research projects
	MOC	MOC's Opinions on Expedite E-Commerce Applications	10/31/2013	Guidelines on e-commerce
	MIIT	Notice of the MIIT on Calling for the Application for "Information Consumption" Demonstration City	10/09/2013	Application for the demonstration city
	NDRC	Notice of the Implementation of Mobile Broadband and the 4G TD-LTE Commercialization Project	09/22/2013	Special grants for mobile broadband and 4G research projects

### 4.1.1 Legitimize Broadband Network as a Public Utility

One unique—and probably the most prominent—feature of China's broadband plan is that it recognizes broadband as a type of public utility. The Chinese Government has conventionally regulated broadband as a value-added telecommunications service. The fact the plan categorizes broadband as a public utility suggests that the Chinese Government now considers broadband as an essential necessity for everyday life. From now on, broadband must be incorporated into government economic and social strategic planning. In practice, according to the plan and later affirmed by the MOHURD opinion, every residential property to be built in urban areas must have optical fiber installed in every unit. In particular, property developers are prohibited from signing exclusive contracts with any specific broadband service provider. Moreover, transmission infrastructure should enable multiple carriers to provide services. For existing buildings, property management may not impede carriers from remodeling and upgrading current out-of-date copper lines (Ministry of Housing and Urban Rural Development & Ministry of Industry and Information Technology, 2013). Currently, replacing the existing copper wires with optical fibers is a thorny issue in China because, in many circumstances, carriers must pay premium prices to gain access to the property, which makes any upgrading efforts time-consuming and expensive. While it is not uncommon for countries' national broadband plans to specify that backbone networks will be financed and built as public infrastructure, China seems to go a step further to grant broadband networks the same "utility" status as conventional utilities such as running water, electricity, roads, and so forth. This integration of optical fiber into compulsory national standards lays the foundation for a broadband-ready society.

### 4.1.2 Open the Broadband Networks to Private Capital

Even though the plan states that fiscal support, special universal service funding, and tax deductions will be available for broadband development, neither the plan nor the subsequent ministerial-level policies have systematically addressed the issue of funding this ambitious project. Because all three major telecommunications carriers in China are state-owned enterprises and control practically the entire commercial broadband backbones and the overwhelming majority of the access lines, they have the responsibility of accomplishing the broadband plan. Nevertheless, the Chinese Government has traditionally assigned China's state-owned carriers similar social contracts, such as funding rural telephone services, supporting domestic standards, and so on.

The Chinese Government encourages private capital to participate in China's broadband plan. According to the new policy, while private capital may not build their own backbone infrastructure, it can enter the "last mile" access sector (Ministry of Industry and Information Technology, 2012). However, some have argued that opening the broadband market to private capital might find a cold reception because the Chinese Government previously forced private capital out of the broadband market due to increasingly stringent state controls on the backbone, and the government has provided no signs that it will relax such controls in the near future (Jayakar & Liu, 2014a).

Theoretically, mandating the installation of optical fiber in every property and allowing private capital to enter the broadband market would help to expedite the broadband rollout in China. Granted, the continuing improvements to infrastructure—higher speeds, more information availability, and so on—will stimulate demand to some extent. However, China's broadband plan is a one-sided supply-driven approach and suffers from the absence of consumer-oriented demand-side policy that could bring direct benefit to end users.

## 4.2 The Unsettled Issue: Struggle for Funding and Control

Previous research has identified two characteristics of China's information policy making. At the central level, China's information policy features deep-rooted political involvement, frequent bureaucratic bargaining, and weak legal institutions (Gao & Li, 2010; Gao & Lyytinen, 2000, 2005; Liu & Jayakar, 2012; Zhang, 2002). A composite of stakeholders, including both internal and external institutions, bargain to increase their share of the pie, with a central administration that tries to use this framework and competitive bargaining to increase the size of the pie (Loo, 2004; Lovelock, 1996). At the provincial and local levels, however, government policies are often poorly implemented and creative compliance is not particularly uncommon (Chin, 2011; Guo, 2003; Keane, 2001). Usually, the central government can generally expect high levels of local compliance only after all the top leaders have agreed on an issue and given it a similar level of priority, (Lieberthal & Lampton, 1992; Lieberthal & Oksenberg, 1988).

Broadband China is no exception. At the national level, the central government has neither allocated any dedicated funds to the plan nor designed a detailed accompanying regulatory framework other than some general statements calling for revisions to the law and regulations that optimize the institutional environment for broadband development. Before the Broadband China Plan, China pushed another similar national strategy, called the Three-Network Convergence Plan, to accelerate the convergence of telecommunications, television, and the Internet to create a competitive broadband market. In 2010, the State Council set a timetable to accomplish this convergence by 2015 (State Council, 2010). However, the incompatibility between the old regulatory model and the expected new converged regulated industry, along with insufficient investment in upgrading the cable network, have resulted in a practically stagnant convergence progress (Liu, 2013). The Broadband China Plan seems to intentionally avoid the issue of regulatory design and chooses to take the traditional silo approach to broadband development.

As expected, various ministries have initiated their respective programs in response to the central government's call. Most of those ministry-initiated programs have taken the form of subsidized pilot projects. As Table 2 depicts, most of the pilot projects target western or rural regions. The public generally does not have access to the exact amounts of funding available for those projects public; however, it is a common practice in China for funding from central government agencies to require matching funds from other parties—usually provincial, local governments, and businesses. Because the central ministries cannot give orders to the provincial governments directly, the provincial governments have to decide whether to participate in those pilot projects and whether to expand provincial budgets for the Broadband China Plan in general. Thus, although on the surface every province and even many local governments have issued their respective programs to carry out the Broadband China Plan, the specific arrangements vary significantly. In its annual review meeting for the Broadband China Plan, the MIIT revealed that only three provinces had allocated financial support for broadband buildup. Thus, China's state-owned carriers primarily have the responsibility for accomplishing the broadband plan. The MIIT has proposed some plans to subsidize the state-owned carriers, which failed to gain consensus due to the opposition from the Ministry of Finance (Jayakar & Liu, 2014b). With the issue unlikely to be settled in the near future, it seems that China will have to continue to rely on the state-owned carriers to implement the network.

As the nation's de facto monopolist providers of broadband services, China's carriers as state-owned enterprises seem to have a satisfactory record in accomplishing the government's projects, particularly when such a project is endowed with political significance. Previous experience has shown that the objectives of China's universal telephone service programs have always been fulfilled; however, numerous studies have found the current arrangement to be both uncertain and inconsistent due to the ambiguous roles played by government and business and by government-business relationships in terms of both regulatory incentives and regulatory governance (Harwit, 2004; Jayakar & Liu, 2014b; Liu, 2012; Xia, 2010; Xia & Lv, 2008). Extending broadband to unprofitable areas requires a significantly higher investment than extending traditional phone service. The plan states that a universal service fund will be established for constructing broadband in the countryside and in the central and western regions. So far, though, except for the subsidized pilot project "Broadband Countryside", the country has made little headway in establishing such a universal service fund. In fact, China has failed several attempts at such a funding mechanism after the country wrote universal service into law in 1996 and China's existing universal service programs continued to be funded primarily by the state-owned carriers.

## 5 Conclusions

In this paper, I critically analyze China's recent broadband policies. Broadly speaking, while their emphases vary, both the plan and the opinions are largely conventional industrial policies that focus on supply-side measures.

Still, they have some notable new features. The plan marks a major paradigm shift in China's information policy regarding broadband. For the first time, the country has formally recognized a broadband network as a strategic public facility. The country has granted broadband networks the same legal status as conventional water, electric, and road utilities. China now officially considers broadband as a necessity rather than an optional value-added telecommunications service, which suggests the Chinese Government's commitment to ubiquitously providing advanced networking. In addition, the country explicitly allows (if not encourages) private capital to invest in the broadband network currently dominated by state-owned carriers. Thus, we can expect a more open and competitive broadband market as the plan develops.



However, China's broadband plan still remains a conventional supply-side industrial policy, and its effectiveness is highly uncertain. First, the plan lacks clear-cut institutional and financial arrangements and primarily relies on the state-owned carriers to fund the broadband rollout. While this approach has worked in the past, carriers are less willing and able to conform because of the already fierce competition among them. Moreover, private capital may not be eager to participate because of the strong competitive position of the state-owned carriers and the lack of clear regulatory assurance. Second, the plan suffers from a lack of balance between supply-side policies that seek to enhance broadband availability and demand-side policies that aim to stimulate consumer awareness. Limited resources are scattered among different government agencies. Since the physical presence of the network can more easily be showcased as a political achievement, inter-ministerial competition tends to encourage government agencies to emphasize infrastructure construction while neglecting consumer needs. However, previous research has found only that demand-side policies have a stronger impact in the later stages of the diffusion process. Third, China's broadband plan leaves out the important issue of universal service. While the plan articulates some principles, it proposes no specific mechanism.

In summary, with some notable conceptual changes, both the plan and the opinion offer little innovation in terms of policy measure. To some extent, the Chinese saying "old wine in a new bottle" seems to aptly grasp the essence of this plan.

Probably the most important lesson one can learn from the above review of China's broadband plan is that the government should align the policy measures with the shifting policy objectives at the different stages of broadband development. Theoretical research and international experiences have demonstrated that, while both supply-side and demand-side policies have a positive effect on broadband diffusion at the initial stage of broadband adoption, only demand-side policies appear to generate a positive and increasing effect after one has reached a certain degree of broadband penetration. While China might not have the highest broadband penetration in the world, the statistics do show that the growth rate has slowed down, which raises the question about whether China has reached that certain degree of saturation. If so, a combination of supply-side and demand-side policies are preferable to the current supply-side only approach, which focuses primarily on building the infrastructure. Thus, I suggest that, instead of enthusiastically promulgating various "plans" or "projects", the Chinese Government and other societies contemplating similar decisions should first conduct a thorough situation analysis and identify the main factors that are impeding broadband diffusion. A clearer vision and a more coherent strategy are imperative. China's current version of the broadband plan is primarily an infrastructure blueprint, not a visionary design for a future broadband ecosystem and network-based economy. In the long term, the Chinese Government must facilitate the creation of an open broadband ecosystem. The current model, which relies almost entirely on government funding and state-owned carriers, is not sustainable over the long term. The inherent contradiction between the government's desire to build a controlled broadband infrastructure and the pursuit of a vibrant Internet-based economy that runs on a free and open network poses a critical—but inevitable—policy challenges for Chinese policymakers.

This paper has several limitations. First, I predominantly analyzed documents to explicate secondhand data, including scholarly research (in English and Chinese), trade magazines (in English and Chinese), and government documents (mainly in Chinese). Future work should interview policy makers and other stakeholders to enrich the depth of the research. In addition, this paper informs interested readers about China's recent broadband policy updates and contribute to the ongoing debate of how developing countries can possibly leapfrog into the information society. As such, I do not develop a rigorous theoretical framework, which warrants future research.

## Acknowledgments

This research was supported by the National Social Science Fund of China (14BGL117) and the Major Program of the National Natural Science Foundation of China (71490722).

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