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Sustainability of rural informatization programs in developing countries: A case study of China's Sichuan province

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ABSTRACT

Traditionally, the role of telecommunications carriers is often limited to providing connections in rural informatization programs. This paper illustrates the case of Sichuan's government-carrier cooperative rural informatization model, where the carriers serve as both the information aggregator and distributor. A close historical analysis reveals that this seemingly unprofitable rural informatization service was originally conceived by competing carriers as a marketing strategy to gain a competitive advantage in less lucrative markets. However, when the government decided to promulgate such an informatization program nationwide, the business practice turned into one of the carrier's *de facto* obligations. Thus, Sichuan's model is a mixture of the passive fulfillment of political duty and the proactive pursuit of business interests. A sustainability failure analytical framework is applied to test the sustainability of Sichuan's model, which is found to be at risk of financial, social and institutional sustainability failures.

1. Introduction

Considered one of the strategies to solve China's high level of urban–rural economic inequality, the Chinese government has initiated various national and provincial programs to connect rural communities to the information highway. The current rural informatization[1] activities are usually composed of relatively independent, but fundamentally interrelated, "projects" sponsored by different government institutions (Xia, 2010). Several statistics have indicated that some significant achievements have been made so far. In terms of connectivity, telephone service was nearly ubiquitous in rural areas and broadband connections were available in 84.7% of all administrative villages by the end of 2012 (MIIT, 2013b). China Internet Network Information Center (CNNIC) estimated that 136 million rural residents had used the Internet in 2011, a nearly 9% increase from the previous year (CNNIC, 2012). In addition, there were over 31,000 agriculture-related websites, approximately 1 million village information

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[1] There seems to be no consensus on the definition of the term informatization (or informatisation) in the academic literature. Analogically speaking, informatization is to the information age what industrialization was to the industrial age. The term gained increasing popularity in China when the Chinese Communist Party included it as one of the major strategic impetuses in the socialist countryside campaign starting in 2007 and later expanded it to other sectors. Despite its wide usage, previous research has found that the term has not been officially defined in China's policy documents. Informed by Rogers (2000) and situated in the Chinese context, we define rural informatization in this paper as a process through which information technologies were used as a means for furthering socioeconomic development in rural areas. (See Liu (2012) for a more detailed discussion on the evolution of this term.)

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service stations and 700 thousand supporting staff members across the country (MOA, 2011)[2]. The unique feature of the Chinese model is the attempt to integrate connectivity and content together both in its strategic planning and national programs, which is arguably the first of its type in the world (Xia, 2010).

As the largest emerging economy, China's strategy in rural informatization is of significant interest to both ICT4D scholars and practitioners of other developing countries. There have been a few studies focusing on the institutional design of China's informatization programs (Hanna, Qiang, Bhavnani, Kimura, & Sudan, 2009; Liu, 2012; Ting & Yi, 2012; Xia, 2010). However, due to the relatively short history and the general lack of familiarity with operational details of China's rural informatization programs, research on this subject is still very limited and, particularly, the existing studies seem to have limited strength in assessing the sustainability of those programs. This paper serves the purpose of filling this important gap by providing a detailed account of the historical evolution of China's informatization program, based on firsthand evidence from the field, and analysis of its sustainability challenges. By looking at Sichuan's unique government-carrier cooperative model, this paper argues that, while Sichuan's model provides a low-cost solution to deliver information to mass recipients in rural areas, it is at risk of financial, institutional and cultural/social sustainability failures.

This article has six sections. The second section briefly reviews the research on China's rural informatization and various theoretical models to study sustainability of ICT4D projects. The research methodology is outlined in the third section. The fourth section presents the case study of Sichuan's rural informatization program, with the emphasis on the historical development. Next, the fifth section summarizes the case and discusses its sustainability issues. The last section derives important implications for rural informatization development in developing countries.

2. Related works

Existing research on China's rural informatization is limited. Most previous studies have been primarily concerned with connectivity, particularly universal telephone service (Harwit, 2004; Jayakar & Liu, 2014b; Shi, 2008; Xia & Lv, 2008; Zhao, 2007). A few studies have assessed China's recent "Information to the Countryside" program initiated in 2009, which required state-owned telecommunications carriers to integrate traditional "*access*" and value-added "*applications*" into a single package in rural areas, and found that although certain noticeable achievements have been made in terms of the increased numbers of rural government websites, rural information stations, and agriculture-related websites, this nationwide informatization program was fragmented under a powerful ideological influence that has led to unclear institutional arrangements and regulatory confusion (Hanna et al., 2009; Xia, 2010). Two separate case studies conducted at the provincial level revealed similar problematic issues, such as a lack of vision, coherent strategy, accountability, and a sustainable business model (Liu, 2012; Ting & Yi, 2012).

Through the lens of institutional theory, most of the above mentioned studies emphasize the institutional factors that influence the way informatization programs operate. These studies aptly describe the status quo, reveal the dynamic relationships among the institutions involved in the informatization program, and identify problems and successes. However, existing studies seem to be more descriptive than predictive, and have limited strength in predicting the sustainability of those programs.

Although most rural informatization research has addressed the issue of sustainability to some extent and identified some influencing factors, researchers have only recently proposed a number of theoretical frameworks and conceptual explanations to understand the long-term sustainability of such projects. The primary focus of early sustainability investigations has been on financial sustainability (Colle, 2005; Harris, Kumar, & Balaji, 2003), and researchers have often evaluated sustainability by analyzing and comparing the business models (Hosman & Fife, 2008; Proenza, 2001; Wellenius, 2003). Heeks and Bhatnagar (1999) proposed the critical success factor (CSF) and the critical failure factor (CFF) models. The ten critical factors that Heeks and Bhatnagar identified were: information, technical, people, management, process, culture, structure, strategy, politics, and environment. Built upon the CSF and CFF models, Kumar and Best (2006) presented a Sustainability Failure Model and argued that the sustainability failure of an ICT4D project usually took five principal forms: financial/economic sustainability failure, cultural/social sustainability failure, technological sustainability failure, political/institutional sustainability failure, and environmental sustainability failure. Similarly, Stoll argued that social, political, cultural and technical sustainability were vital elements to achieve financial sustainability (2005). Other theoretical models include "design-actuality" gaps, the match or mismatch between information system designs and local user actuality, based on the contingency theory (Gerhan & Mutula, 2007; Heeks, 2002) and the stakeholder theory, which presumes the necessity of a well-balanced partnership between players, particularly between informatization actors and the beneficiary (Bailur, 2006).

This paper is informed by Kumar and Best's Sustainability Failure Model. The model provides a succinct analytical framework to cover the major factors that imperil the long-term sustainability of an informatization program. If a program (or project) adequately addresses the five areas of weaknesses outlined by the model, it is likely to be sustainable. This model has been used to analyze Internet kiosks in India (Best & Kumar, 2008; Kumar & Best, 2006). However, to the best of our knowledge, this model and other models summarized above have not been utilized to study a nationwide informatization program, such as the one studied in this paper.

[2] These statistics should be read with caution because different institutions might have different definitions for "rural informatization".