

# An Exploration of Remote Healthcare Service Adoption from multi-stakeholders in China

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**Abstract:** This study explores the attitudes of healthcare stakeholders for remote healthcare service in China. By analyzing the dynamics of patient perceptions of technology innovation through surveys, we hope to identify the key attitudes and groups of patients in both contexts as well as their alignments with the views of healthcare workers. The healthcare IT managers and their perceptions of technology innovation will be analyzed. The patients and their relationship with doctors will also be considered. Survey data from several thousand healthcare IT managers, workers, and patients from a nationwide Chinese sample has been collected. We will further develop a survey to understand key stakeholder beliefs and attitudes that enable and inhibit healthcare technology innovation projects.

## Introduction

This study explores the attitudes of healthcare stakeholders with regard to technology innovations in order to better identify strategies and key opportunities for improvement. It fills a critical gap in existing healthcare innovation research because it serves as a first study, to our knowledge, looking at the importance of IT managers' attitudes and beliefs as one stakeholder and how they impact the options and constraints healthcare organizations face when innovating with technology.

Additionally, this is an international study in the Chinese context, where substantial government support and wide adoption of mobile technologies offers huge potential for change. Innovation in the Chinese healthcare context has been recognized as more important to the US healthcare system in recent years as major influenza epidemics have begun in China and spread to the US. Given the large size and scope of healthcare reform in China, it serves as an interesting and critical case for understanding how technology might be used to innovate healthcare.

In this study, the specific research questions are:

- What are the factors impacting IT managers' decisions on remote healthcare service adoption in the hospitals? Will the previous network usage experience impact their attitude toward innovation?
- What the opinions from doctors regarding delivery remote healthcare services?
- Will patients in the countryside and city vary regarding their attitudes toward remote healthcare service adoption?
- What services could be good choices for remote delivery? Which method should be chosen for the delivery?
- What kind of hospitals could be the first adopters of remote healthcare services?

## Literature Review

With the development of mobile technology and broadband internet access, remote healthcare service has been growing quickly worldwide (Pratt, Unruh Civan and Skeels, 2006). Remote healthcare can save time, travel expense and reach out to more patients. Meanwhile, even in the most advanced countries, such as the US, usage of technology to innovate healthcare runs into many impediments even though billions of dollars have been invested in such systems (Kellermann and Jones 2013). One of the key problems faced in implementing healthcare technologies is getting the members of an organization to understand, accept, and value the usage of a new system (Devaraj and Kohli 2000; Herzlinger 2006; Kun et al. 2007; Regan et al. 2000). Old ways of delivering care persist even in the face of evidence demanding they change (Asch and Volpp 2012).

The Chinese context offers a very interesting natural laboratory for examining innovation of healthcare through applied technology innovation. The healthcare system in China has undergone somewhat radical privatization over the past decade, leading to a system in which individual providers should be motivated to try new models and tools (Blumenthal and Hsiao 2005). Nonetheless, as in the US context, the balance between government and private roles in care delivery are uncertain and in need of study (Wang 2009). Additionally, the application of new technologies is considered a key opportunity for addressing the critical need for community level health (Wang et al. 2011).

Theories in the field of information systems research suggest key drivers for successful innovation using technologies. Many of these predicting individual-level acceptance of technology have recently been unified (Venkatesh 2003). Other theories focus on organizational acceptance of technologies (Barley and Tolbert 1997) and how they diffuse through whole industries (Rogers 2001). We believe healthcare technology innovations operate at both of these

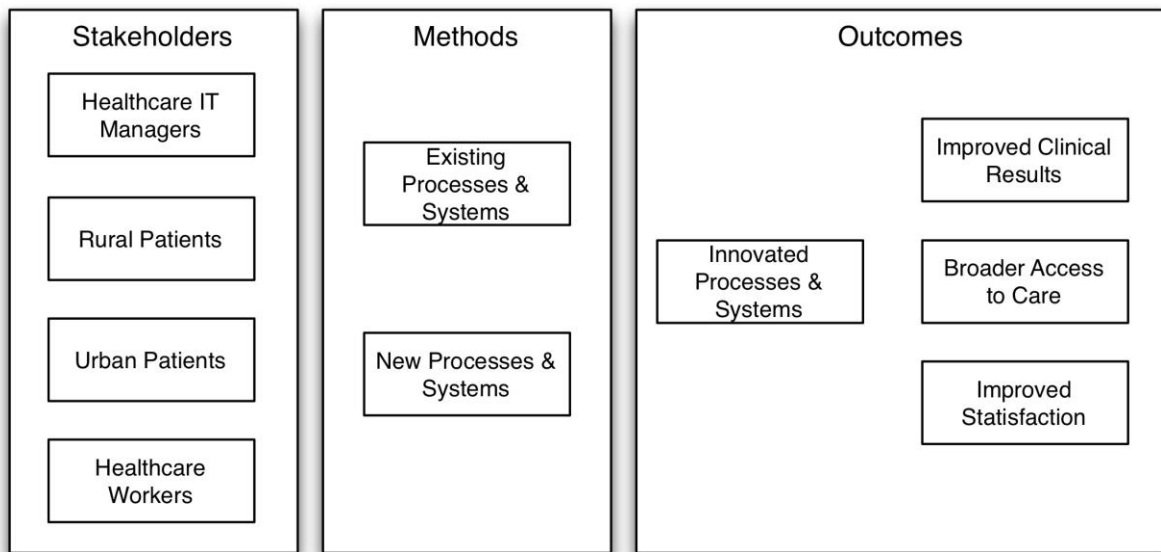
levels. Individual doctors, patients, and nurses have to be willing and able to use systems. At the same time, there are huge national programs in place supporting and driving certain types of innovations regardless of whether individuals are willing and able, particularly in the privatized organizations. These two forces may align or conflict. Our study will help discern factors that enable and inhibit successful healthcare technology innovation, with a particular eye to the pressing, current issues of using mobile, internet technologies in provision of rural care.

## Research Framework

We conceive of the healthcare research space in terms of stakeholders, methods and outcomes (Figure 1). In this study, we will begin by focusing on the healthcare IT managers and their perceptions of technology innovation. We believe the IT managers sit in the key role for balancing the potentially competing pressures of national/organizational mandates and individual user acceptance. As a result, we believe their beliefs and how they are shaped and vary with regard to the potential of innovation will be critical in understanding the potential and success of specific projects.

Our second focus will be on the patients and their relationship with doctors. We divide the patients between rural and urban in the Chinese context due to the large, observed differences between rural and urban education, wealth, and access to care noted in articles cited above in our literature review. Additionally, the current emphasis on rural care provision implies that there is a specific challenge reaching rural areas that new technologies (mobile, internet) can address.

By analyzing the dynamics of patient perceptions of technology innovation through surveys, we hope to identify the key attitudes and groups of patients in both contexts as well as their alignments with the views of healthcare workers. So doing, we will be able to address our research questions. This initial study will deal with the perceptions of stakeholder groups of the methods and outcomes shown in our research framework, but we do not expect to collect direct measures of these latter dimensions. Interestingly, prior work on healthcare technology innovation has often assessed only the methods and outcomes. We believe this has been a key mistake that leads to project failures. Thus, we focus on the stakeholders and their role in supporting or opposing healthcare technology innovations.



**Figure 1 Research Framework**

## Research Method

### Sample

Our sample comes from the Chinese healthcare reform context. As noted earlier, this is a very relevant context for understanding mobile, internet technology innovation. The development of remote healthcare in China has emerged since 1994. Shanghai HuaShang Hospital started the first telephone based remote conferences. In 1997, China set up the Golden Healthcare Network to connect about 23 large hospitals across over 20 provinces together. In the past decades, Chinese government has invested dramatically on the development of remote healthcare by updating the communication media. Facing the limited resources and a large population, remote healthcare is ranked high by the government in the development strategy of next decade.

The setup of G3 and G4 cellular networks enables the usage of mobile phone services. Based on a survey issued by China mobile, the largest mobile service provider in China, 96% of the households in rural areas have mobile phones as of 2008. In addition, 67% of rural households and 82% of urban households have the access to the fixed-line telephones. According to a report issued by China Internet Network Information Center Internet (Osborne, 2013), by the end of 2012, the Internet usage population reached 564 million with the penetration rate of 42% of the total population. Among these with Internet access, 67% was conducted through mobile phones. The well-established mobile network infrastructure provides the feasibility for the quick development of remote healthcare services.

## Expected Contribution

Theoretically, our study will explore factors that enable and inhibit successful healthcare technology innovation implementation from multiple stakeholders. We also illustrate the impact of IT managers' attitudes and beliefs on the options and constraints healthcare organizations face when innovating with technology. In practice, our result will help government make customized policy to different areas (rural and urban) for innovative remote healthcare service implementation. In addition, it will also help healthcare service providers to understand how to interact with hospital IT managers to promote their services.

## Current Progress

Currently, we have collected survey data from several thousand healthcare IT managers, workers, and patients during a pilot study from a nationwide Chinese sample. The initial analysis surfaced many interesting questions, some of which are reflected in the research questions posed in this proposal. In addition to this data and its analysis, both qualitative and quantitative methodologies will be employed in this project by utilizing the strengths of the two methodologies.

We will conduct further literature review to understand the current research status in healthcare industry in China. Based on these findings and the questions surfaced in the analysis of our pilot data, we will administer initial semi-structured and open-ended interviews with hospital doctors, IS managers in charge of hospitals IT investment and patients. These interviews with all the different stakeholders will provide us insights on their opinions on system adoption.

Our final stage will involve developing a survey to help identify key stakeholder beliefs and attitudes that enable and inhibit healthcare technology innovation projects. We will pilot and validate this survey instrument using a sample of stakeholders in the Chinese context provided through our cooperation with Harbin Institute of Technology.

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