



Government in standardization in the catching-up context: Case of China's mobile system



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ARTICLE INFO

Available online 14 November 2013

Keywords:

3G

Catching-up

China

Role of the government

Indigenous innovation

Standard

Standardization

TD-SCDMA

ABSTRACT

This paper categorizes the multiple-faced roles of the government in technology standardization in the catching-up contexts. It presents a case that China has developed a third generation (3G) of mobile system, TD-SCDMA, and deployed it in the Chinese market. The authors attribute the success of this national standardization initiative to that the government is able to balance the interests of different stakeholders of mobile technology and market, and enroll them into the process of TD-SCDMA development and industrialization. The TD-SCDMA case demonstrates that the government in the standardization process can act as a project founder, risk undertaker, interest moderator, collaboration facilitator, and process monitor. Practical implications for developing countries in pursuing their indigenous innovation strategy are given.

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1. Introduction

In recent years in the globalization process, there is an ongoing debate on the opportunity of the developing countries in technology. China receives a specific attention in this debate, which is changing from a large importer to a manufacturing base of information technology in the world. China is catching up and appears to become an important global player in technology development, owning some important technologies like Digital Video Disc, Audio and Video Coding Standard, and Linux-based office applications (Suttmeier, 2005). Given its specific economic, social and political environment, how can the Chinese government balance the interests of different stakeholders of technology and market, and pursue its strategy of becoming a powerhouse in the global arena of technology standardization? This paper will answer this question by presenting a case that China has developed and adopted a third generation (3G) of mobile system called TD-SCDMA (Time Division Synchronous Code Division Multiple Access). The case study serves the purpose of filling an important research gap, which is the categorization of government's multiple-faced roles in standardization.

In the global scale, China owns the largest mobile telecommunications market that keeps growing at one of the highest rates. In 2007, China had about 0.5 billion mobile subscribers (MII, 2007), a figure of the combined population number in the US and Japan. At the end of February 2012, this number hit a milestone of 1 billion (Forbes, 2012). Considering its market size, China's strategy of developing and implementing 3G standards is of significant interest to the international

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telecommunications world. According to the 2004 General Accounting Office survey of US companies with a presence in China, standards as represented by the case of TD-SCDMA are the most serious issues on an extensive list of the World Trade Organization (WTO) commitment areas (Updegrove, 2005). The analysis of China's experience of standardization on 3G technologies is interesting to both technology innovation scholars and practitioners in the telecommunications market (McDougall & Foley, 2004). The existing international standardization infrastructure, which has been formed for more than a century by Western countries, may not apply to the case of China. The TD-SCDMA case allows us to appreciate the methods for the government to promote indigenous technologies in a big emerging economy, and helps us understand the reality and future challenges that the developing countries will face in exploring and adopting their home-grown technologies. It is useful to the developing countries when drawing lessons for their future national innovation efforts.

This article has five sections. The second section briefly introduces the technology background of cellular mobile systems, defines standard and standardization, and reviews research on the role of government in standardization, specifically in the TD-SCDMA case. The third section outlines the research methodology. The fourth section presents the Case study of TD-SCDMA standardization in China. The last section examines the case study results. It discusses the roles of government in technology standardization, and derives important implications for standard development and diffusion in developing countries.

2. Backgrounds and literature

2.1. Mobile telecommunications standards and standardization

A standard defines the overall architecture of a technology system, accompanied by a set of interface specifications among component sub-systems. Standardization is the process of developing, ratifying and implementing standards (David & Greenstein, 1990). The development of mobile telecommunications industry is based on the emergence of new technology standards, which have undergone three generations, along the trajectory of offering more stable and better communications services. The first generation (1G) of mobile system was available through the 1970s and 1980s. It featured mobile phones with analog voice signaling. The second generation (2G) was introduced into the market in the early 1990s. The 2G family mainly consists of Global System for Mobile communication (GSM) and narrowband CDMA (CDMA One) standards. GSM is the most used 2G system in the world. Its standardization was initiated in 1982 by the European Conference of Postal and Telecommunications Administrations, a coordinating body for European state telecommunications and postal organizations. 13 European countries participated in the development of GSM standard, which in 1989 was ratified by the European Telecommunications Standards Institute. CDMA One was a proprietary standard of Qualcomm in the US, mainly used in North America and parts of Asia (Gandal, Salant, & Waverman, 2003). In China, the state-controlled China Mobile and China Unicom run GSM and CDMA One systems, respectively, with GSM taking a dominant market share (Mii, 2007).

In 1999, the International Telecommunications Union (ITU) approved three standards for 3G mobile networks, composing the so-called International Mobile Telecommunications-2000 (IMT-2000). All based on CDMA technology, these three 3G standards are commonly known as CDMA2000, WCDMA (Wideband CDMA), and TD-SCDMA. CDMA2000 and WCDMA are backwards-compatible extensions to CDMA One and GSM networks, respectively. But TD-SCDMA is a revolutionary one that requires all-new networks. Thus, various network operators in different regions of the world have progressed along alternative paths towards the 3G market. Specifically, CDMA2000 is mainly used in America to replace CDMA One. WCDMA has been mandated by the EU parliament as the European 3G standard (Gandal et al., 2003). In China, the development and adoption of the home-grown TD-SCDMA has been organized a national initiative.

2.2. Literature review

In recent years, standardization has received increasing attention from information technology scholars and practitioners, as standards play a significant role in achieving economic goals (Blind, 2011), and the standard owners can capture the direction of future technological progress (Steinmuller, 2005). The government is recognized as an important standardization actor. It can promote technology development and diffusion by conducting or investing in research, seeding the development of resources or services, forming state-led standard-setting consortia, establishing national science parks, procuring products, and mediating private sector competition (Funk & Methe, 2001). The government can motivate different vendors and research institutes with the required technological capabilities to join in a standardization initiative, convene diverse interests and facilitating cooperation, and help them collaborate with each other efficiently in the standardization process (Hanseth & Monteiro, 1997; Teece, 1986). The government can present political interests, and ensure them being attached to a standard and the standardization efforts. In the context that standardization becomes an international issue, a government takes the responsibility of protecting the interests of domestic manufacturers, and supporting them to play a key role in international standardization initiatives (Kennedy, 2006; Van De Ven, 2005). While the government in standardization is an interest research subject, there is no research that categorizes the government's roles in standardization.

In recent years, in practice there is increasing involvement of the Chinese government in initiating and facilitating technology standardization (Kennedy, 2006; Ure, 2006). There are extensive academic debates around the failures or successes of China's national system of innovation. It is found that the techno-nationalism of China has promoted

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