



State-led technological innovation of domestic firms in Shenzhen, China: Evidence from liquid crystal display (LCD) industry



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ABSTRACT

Since 2000, particularly in the aftermath of the global financial crisis, there has emerged revisit of the role of the state in technological upgrading of latecomer cities and regions in developing countries, including China. The effectiveness of a technological innovation strategy driven by transnational corporations (TNCs) has been questioned, despite its significant contribution to rapid industrialization via strategic coupling in the global production networks (GPNs). There has been a paradigm shift of innovation policy towards indigenous innovation through state-led explicit coupling of designated domestic firms and lead firms in the GPNs. The practice of this remains understudied, however. By examining the development of the liquid crystal display (LCD) industry, one of the strategic emerging industries (SEIs) in Shenzhen, this paper sheds light on the collective roles of various state authorities ranging from the central to provincial and municipal governments in fostering technological innovation of domestic firms (e.g. CSOT) through explicit coupling with global lead firms (e.g. Samsung). The empirical experience in Shenzhen indicates that indigenous innovation focused on domestic firms may unnecessarily exclude the participation of TNCs. This study urges more research to examine the changing dynamics of technological catch-up of domestic firms in an increasingly globalized and uncertain world economy.

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Introduction

Integration into global production networks (GPNs) or global value chains (GVCs) through transnational corporations (TNCs) has been widely adopted by latecomer cities and regions in less developed countries (LDCs) as a major engine of technological catch-up. Governments in developing countries, including the People's Republic of China, expect that the advantageous technological knowledge embedded in TNCs can drive technological upgrading through spill-over of knowledge. However, in pursuing participation in GPNs/GVCs, TNCs and the Chinese state have distinctive goals. Unlike TNCs, which are looking for lower production costs, greater profits or growing market, the Chinese state hopes to gradually develop its independent innovation capability. Since 2005, the Chinese government has turned to question the effectiveness of a strategy for technological upgrading driven TNCs (Fu & Gong, 2011). Notably, there has emerged a paradigm shift of national innovation policy towards indigenous innovation with more focus on domestic firms (State Council, 2006). While the indigenous innovation strategy has been reiterated since 2006, it did not turn into full implementation until 2009 in the wake of the global financial crisis. In 2010, seven strategic emerging industries (SEIs) –

energy efficient and environmental technologies, next-generation information technology (IT), biotechnology, high-end equipment manufacturing, new energy, new materials, and new-energy vehicles – were designated by the central government. These SEIs, regarded as knowledge- and technology-intensive industries with less resource consumption, are expected to foster technological upgrading of domestic firms. Local government authorities, such as the Guangdong provincial and Shenzhen municipal governments, announced similar SEIs to replace the low-end, labour-intensive, environment-polluting and high energy consumption industries primarily invested in by TNCs from Hong Kong and Taiwan (Yang, 2012). 'Transition from production to innovation' through developing state-designated SEIs has become a slogan on policy agendas at various levels of government in China, while the practical progress and effects on technological upgrading trajectories remain understudied.

Existing empirical studies on industrial upgrading and urban/regional development in the context of East Asia and China in particular have focused on how TNCs in latecomer regions, as lower tiers of suppliers in the GPNs, have strategically coupled with the imperatives of lead firms, in which domestic firms have been largely excluded (Wei, Liefner, & Miao, 2011; Yang, 2009; Yang & Coe, 2009). TNCs, primarily from Hong Kong and Taiwan, have established the so-called 'closed' production networks among themselves in the regional powerhouses in post-reform China, i.e.

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the Pearl River Delta (PRD) and Yangtze River Delta (YRD), with insufficient participation of domestic firms (Wei, Zhou, Sun, & Lin, 2012; Yang & Liao, 2010). The effects of strategic coupling without the participation of local firms is questionable. Furthermore, recent studies have called for more efforts to examine the changing roles of the state in technological upgrading (Lee, Heo, & Kim, 2013). Taking the liquid crystal display (LCD) industry, one of the state-designated SEIs, as a case study, this paper argues that the state has played an increasing role in fostering technological upgrading of domestic firms. This paper sheds light on the collective role of state authorities, ranging from central to provincial and municipal governments, in fostering strategic coupling of domestic firms (e.g. CSOT) with lead firms (e.g. Samsung) in the development of LCD industry in Shenzhen.

In the following section, the changing role of states in technological evolution with the integration of domestic firms in the GPNs will be critically reviewed. An evolutionary framework will be developed to acknowledge the state as an active participant in technological upgrading through fostering strategic coupling of domestic firms and global lead firms. Then the paradigm shift of innovation policies, particularly the collective role of various levels of state authorities in technological upgrading in Shenzhen, will be presented. We will then explore the state-led technological catch-up of domestic firms through strategic coupling with lead firms in GPNs, taking China Star Optoelectronics Technology (CSOT), a business group of TCL Corporation, as a case. The paper concludes with a summary of the main findings and discussion of the theoretical and policy implications.

State-led technological catch-up of domestic firms in contemporary globalization

Changing role of the state in technological upgrading

Since the early 2000s, the global value chains (GVCs) and global production networks (GPNs) perspectives have gained popularity as ways to examine the international expansion and geographical fragmentation of production and consumption (Coe, Hess, Yeung, Dicken, & Henderson, 2004 and Coe, Dicken, & Hess, 2008; Gereffi, Humphrey, & Sturgeon, 2005). Unlike the GVC approach, which puts more emphasis on national development and the international context (Gereffi, 2013; Sturgeon & Kawagai, 2011), the GPN framework attempts to 'hold down' globalization to regional/sub-national development, i.e. 'globalizing regional development' (Coe et al., 2004 and Coe et al., 2008; Hess & Yeung, 2006). As Zhu and Pickles (2013: 9) found, 'most studies from the GVCs perspective have focused on the diversity of forms of governance within the value chain, rather than on the role of state actions and government policies.' While the governance of GVCs is built upon 'regardless of the institutional context within which they are situated' (Gereffi et al., 2005: 99), GPNs regard institutions, including state and non-governmental organizations, as important actors of the global production (Hess & Yeung, 2006).

Similarly, studies on GPNs have been questioned for underestimating the potential role of the national state in coordinating localized growth factors with globalizing external factors (Lee et al., 2013). Regional assets provide important resources for regional development, but must be harnessed by regional institutions to 'complement the strategic needs of trans-local actors situated within global production networks' (Coe et al., 2004: 470). The 'embedding of GPNs into regional economies is of course no guarantee of positive developmental outcomes, even if it results in new or enhanced opportunities for value capture at the local level' (Coe & Hess, 2011: 134). In examining the development of the LCD industry in South Korea, Lee et al. (2013) postulate a 'new' role

of the national state as an active inter-scalar mediator in the dynamic strategic coupling between global leading firms and local actors in globalizing regional development. In the context of China, the outbreak of the global financial crisis has prompted support for state intervention in technological upgrading (Liu and Cheng, 2011), while the ongoing state-led technological upgrading remains under-examined. Notably, the contemporary globalization has been marked by significant transformation in the organization and governance of production, innovation, consumption and distribution since 2000, particularly after the 2008 global financial crisis and world economic downturn (Cattaneo, Gereffi, & Staritz, 2010). One of the fundamental implications is that the extreme asymmetries of power in favour of lead firms are shifting in many cases towards the strategic contract suppliers in emerging economies, in which the state has played increasing roles. National and regional development models have come under increasing scrutiny, and countries/regions are trying to determine what kinds of policies and institutions provide the best opportunities for long-term growth and prosperity (Gereffi, 2009; Yeung, 2009b). Taking into account the variable and contingent 'spatio-temporality' of GPNs (Coe et al., 2008: 272, original italic), an evolutionary perspective on strategic coupling is imperative to conceptualize regional transformation in contemporary economic globalization.

In response to the changing global-local dynamics, there emerges a plea for an evolutionary approach to understand urban and regional economic resilience as adaptive process has been attracting growing attention from economic geographers (Simmie & Martin, 2010). As Boschma and Martin (2007: 538) put it, the evolutionary economic geography (EEG), or "the 'evolutionary turn' in economic geography has gained sufficient momentum to merit recognition as a distinct perspective no less promising in scope than the other approaches to economic geography that have been proposed in recent years (such as the cultural, institutional and relational 'turns'." Coe (2011) identifies three main branches of EEG: work on path dependence and lock-in in different geographic contexts; research on clusters, localized learning and related variety; and examinations of the spatial evolution of industries across the economic landscape. According to Martin and Sunley (2006: 400), '(t)he economic landscape inherits the legacy of its own past industrial and institutional development, and this history can exert a major influence on conditioning its future development and evolution.' A new wave of interest in this field has been focusing on why some regional economies manage to renew themselves while others remain unable to adapt in an increasing globalizing and uncertain world (Simmie & Martin, 2010). Existing literature on regional economic adaptabilities mainly focuses on developed regions and old industrial clusters (Boschma, 2009; Lee et al., 2013), little has been written on the changing role of the state and state adaptation in technological upgrading of late-comer regions.

Since the 1990s, the geography of innovation has become an important field in economic geography in terms of urban and regional development (Shearmur, 2012). One of the predominant streams is the regional innovation systems (RIS) approach, where a RIS is defined as where 'firms and other organizations are systematically engaged in interactive learning through an institutional milieu characterized by local embeddedness' (Cooke, Heidenreich, & Braczyk, 1997: 1581). Despite the proliferation of the RIS approach in the literature, Asheim, Lawton, and Oughton (2011) argued that much of the empirical work on RIS has been based on well-functioning, successful regional economies and innovation in high-tech sectors, which needs to be supplemented with further theoretical and empirical analysis of 'less successful' systems and of innovation in more traditional industries. Moreover, most studies are conducted from 'a static perspective, while questions in relation to where RIS initially emerge, and why and

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