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The dual role of local sites in assisting firms with developing technological capabilities: Evidence from China

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ABSTRACT

As strong local knowledge bases emerge in some developing countries and regions, more research efforts are devoted to examine the role of local sites in technological-capability development of firms from developing countries. However, most of these studies illuminate the direct input (e.g., knowledge, human capital) and the role of motivating multinational companies (MNCs) to upgrade their local operations in developing countries so as to perform more innovation activities. Few articles are presented that examine the role of local sites in the learning and technological-capability building processes that take place during technology import activities. This study investigates how local sites in developing countries help their firms benefit from the spillovers of international technology diffusion, by empirically scrutinizing Chinese licensee firms. The empirical results support the hypothesis that Chinese local sites assist with their firms' technological-capacity building, driven by international technology licensing-in activities, in three indirect ways. That is, the enrollments of sufficient R&D personnel from local sites, the collaborations with local universities and research institutes, and the collaborations with local industrial community firms positively influence the relationship between firms' international inward technology licensing and technological capabilities.

1. Introduction

In the era of the knowledge-based economy, the role of local sites—serving as important knowledge bases for local firms' innovation and successful competition on the global market—has been widely recognized in the territorial-innovation theory family as national (regional) innovation systems, industrial clusters, and innovative milieus (Cooke, Gomez, & Etxebarria, 1997; Freeman, 1995; Oerlemans & Meeus, 2001; Porter, 1990; Yam, Lo, Tang, & Lau, 2011). On top of these studies, researchers have shown the importance of local knowledge bases in advanced countries where the amount and the quality of local actors such as companies, research institutes, and universities (Cooke et al., 1997; Wong, 2001) not only act as the dominant sources of knowledge for their own local companies, but also serve as important knowledge sources for latecomer firms in developing countries to technologically catch up through the means of technology licensing, setting up joint ventures, etc. (Archibugi & Michie, 1997; Ernst, 2002; Hobday, 1995; Lall, 2000; Mytelka, 2004). Going beyond the research context based on developed economies, research on the role of the local site has shown that in developing countries, the local site mainly matters in developing the human resources and thus conditioning the inflows of foreign direct investment (FDI), which is supposed to yield positive knowledge spillovers for latecomer firms (Berger & Diez, 2006; Liefner, Hennemann, & Lu, 2006).

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However, this insight is increasingly challenged with the emergence of domestic knowledge bases in some developing countries/regions where considerable efforts have been devoted to narrow the gap between their knowledge bases and the ones of advanced countries (Athreye & Cantwell, 2007; Dahlmann & Aubert, 2001). For instance, China, after more than 30 years of continuous investments in research and education, has been healthily endowed with sizable leading universities, internationally competitive research institutes, as well as a large amount of high quality but cheap human resources (Chen & Li-Hua, 2011; Liefner et al., 2006). This raises the question of what are the implications of the role of the local site for firms' innovation in these countries where their domestic knowledge bases are growing quickly? The traditional stream of study remains focused on the implication for multinational companies (MNCs) and argues that a strong local site is conducive for the upgrading of MNCs' local operations and for innovating in their affiliates for both the local and global markets (Berger & Diez, 2006; Dunning & Lundan, 2009; Mowery & Oxley, 1995; Narula & Duysters, 2004). Most recently, studies observed—by examining the positive effect brought by collaboration between latecomer firms and local universities and research institutes in the innovation process—that the presence of well-established universities and research institutes creates unique opportunities for latecomer firms from developing countries to build up their own technological capabilities (Ernst, 2002; Fu, Pietrobelli, & Soete, 2011; Li, 2011; Liefner et al., 2006). Collaboration has become increasingly popular and generates a positive effect on firms' innovation performance, according to a group of scholars (Alcorta, Tomlinson, & Liang, 2009; Altenburg, Schmitz, & Stamm, 2008; Liefner et al., 2006; Motohashi, 2008; Yam et al., 2011).

Despite these contributions, little is known about whether local sites also matter in assisting firms from developing countries to build their own technological capabilities through acquiring and assimilating technology diffusion from advanced countries. Given the fact that international technology diffusion is the "building block" that develops the indigenous technological capabilities of latecomer firms in developing countries (Desai, 1980; Fu et al., 2011; Katrak, 1990; Lall, 2000), we thus believe that it is important to tap into this question.

Looking into the literature concerning technology catch-up in developing countries, it has long been recognized that for developing countries to benefit from the knowledge spillovers from the knowledge bases in advanced countries, and to accelerate their technological learning and capability formation, a strong domestic knowledge base is crucial (Berger & Diez, 2006; Cohen & Levinthal, 1990; Ernst, 2002; Freeman, 1995; Hobday, 1995; Mowery & Oxley, 1995). In order to achieve this and further improve their technological capabilities, developing countries need to combine diverse international and domestic sources of knowledge to compensate for their initially weak local knowledge base (Fu, 2008; Mathews & Cho, 1999; Walcott, 2002). The extraordinarily successful catch-ups of South Korea, Singapore, Taiwan, and Hong Kong have demonstrated the importance of the local site in helping them to learn from foreign technologies, finally enabling these countries to reverse the sequence of technological-capability building (Fu et al., 2011; Katrak, 1990). Yet there has been no systemic study on the roles played by the local site in these successful catch-up countries and regions. The extant evidence is a scattered collection of individual cases at different levels of detail (Roberto & Nelson, 2006). As the scenario turns to some current developing countries, the evidence becomes even more scant. As Yam et al. (2011) point out, so far no substantial discussion has taken place on how a catch-up firm interacts with its local site to enhance its technological capacity to achieve competitiveness in developing countries.

This study sets out to empirically fill this gap in nature. Specifically, we focus our analysis at the firm level and investigate how firms use important local parties—universities, research institutes, and other industrial firms—to get access to R&D personnel, knowledge, and technical services when they seek to benefit from imported technologies and develop their own technological capabilities. Our work is based on a sample of Chinese indigenous high-tech firms that engaged in foreign technology licensing activities between 2000 and 2003. It is worth noting that, as we seek to investigate this important question, there are several benefits to selecting Chinese licensee firms as our research setting. First, among the various channels for accessing foreign technology, inward technology licensing is the one most used by latecomer firms. On the one hand, licensee firms in developing countries can directly access the foreign technology and use it via licensing activities (Grindley & Teece, 1997; Leone & Reichstein, 2012). On the other hand, we can easily identify the firms who are involved in technology licensing activities. Next, high-tech firms are usually considered the most innovative firms. Their learning and technological capability building is very important for them to successfully compete (Singh, 2008) in a dynamic environment. This in turn provides a more convenient way to trace their technology activities. Also, compared to other channels of international technology diffusion with mixed evidence, for instance, the FDI, there is increased evidence to show that international inward technology licensing plays an essential role in catalyzing firms' learning and technological capability formation in developing countries (Johnson, 2002; Lin, 2003; Tsai & Wang, 2007). In this sense, focusing on the channel of international technology diffusion through technology licensing to develop hypotheses can strengthen the reliability of our conclusions. In addition, to explore our question more deeply, we can benefit from a unique but unexplored dataset pertaining to licensing activities in China. This dataset could provide us with detailed information about licensees.

The study makes several contributions. First, it contributes to the literature of the territorial innovation theory family. To the best of our knowledge, this is the first study to quantitatively examine at the firm level the role of the local site in facilitating learning and technological capability formation in developing countries. Put differently, it thus complements the recent argument that the local site has a direct effect on latecomer firms' technological capability development by pointing to an indirect effect. This suggests local sites in some developing countries have a dual role, i.e., acting as an alternative knowledge source for latecomers and also serving to help firms benefit from foreign imported technology. Second, our endeavors might be seen as the work to reconcile studies in catch-up literature that emphasize either the role of foreign technologies or indigenous developments of technologies in pursuing technological capability building of latecomer firms.