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Managing international technology transfer risk: A case analysis of U.S. high-technology firms in Asia

Mark V. Cannice^{a,*}, Roger (Rongxin) Chen^{a,1}, John D. Daniels^{b,2}

^a*School of Business and Management, University of San Francisco, 2130 Fulton Street,
San Francisco, CA 94117, USA*

^b*Department of Management, School of Business, University of Miami, Coral Gables, FL 33124-9145, USA*

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Abstract

Using a comparative case analysis of nine U.S. high-tech manufacturers transferring technology to Asian operations through direct investments (wholly owned operations or joint ventures), we examined how they are protected against competitive loss of these technologies. We found some support for internalization theory in that companies preferred wholly owned operations as a means of protection. However, wholly owned operations were not always possible nor were they always sufficient to protect technologies. We found that companies additionally minimized transfer risks by viewing their technologies as a system, thus transferring only peripheral or dependent technologies. Further, they used prioritizing and segmenting technology levers to guard technology either in conjunction with or in lieu of entry mode.

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1. Introduction

The capacity to translate knowledge into high-value products and services has emerged as an important competitive asset (Porter & van Opstal, 2001). Viewing technology as firm level

* Corresponding author. Tel.: +1-415-422-6785; fax: +1-415-422-2502.

E-mail addresses: cannice@usfca.edu (M.V. Cannice), chenr@usfca.edu (R.R. Chen), daniels@miami.edu (J.D. Daniels).

¹ Tel.: +1-415-422-6546; fax: +1-415-422-2502.

² Tel.: +1-305-284-6493; fax: +1-305-284-3655.

knowledge, we define it as any process that transforms inputs into outputs. As technology has become increasingly important to global competitiveness (Zahar & Covin, 1993), governments, company managers, and researchers have paid more attention to alternatives involving its international transfer. For example, host governments have enacted policies that attempt to gain greater domestic access to foreign technology at a reasonable cost (Peng, 2000). These policies largely target multinational enterprises (MNEs) that account for a huge share of global R&D. Concomitantly, MNE managers must decide *whether* to transfer technology, *which* technology among a portfolio of technologies to transfer, and *how* to transfer technology abroad. We focus on the managers' decisions of *which* and *how* in this paper, taking *whether* as a given.

On the one hand, managers want their companies' technologies to gain them cost and sales advantages abroad (Isobe, Makino, & Montgomery, 2000). On the other hand, they do not want to lose competitive leadership by enabling other companies to gain quicker access to their technologies (Anderson & Gatignon, 1986; Buckley & Casson 1976). In other words, companies do not worry about international technology transfers per se; rather, they worry about technology appropriation by potential competitors, whether domestic or foreign (Liebeskind, 1996). Nevertheless, a company may have less protection against appropriation of its technology some places abroad than at home. This is because many countries offer little protection of industrial property rights and allow more freedom for ex-employees to take proprietary information with them to other companies (Czub, 2001; Weeks, 2000). So how do/can firms simultaneously exploit and protect their technology?

Much of the literature on international technology transfer is based upon internalization theory and focuses on entry mode (Buckley & Casson, 1976). Internalization theory contends that MNEs exist in order to exploit firm-specific knowledge internally by extending their organizational boundaries into foreign markets through wholly owned subsidiaries. Firms have an incentive to keep their knowledge/technology within their own subsidiaries as knowledge is a public good and its value, if compromised, diminishes rapidly. This view is reiterated by Rugman (1981) who contends that the lack of a proper market for the sale of information created by the firm leads the firm to create an internal market of its own. However, there is evidence that companies transfer technology both internally and externally (Meyer, 2001).

Internalization theory builds on the early market imperfections work by Coase (1937). It contends that firms are encouraged to exploit their technology on their own because they otherwise incur the costs to monitor partners' (licensees or joint ventures) use of their knowledge and incur risks that partners will violate the terms of technology agreements. Transaction cost theory also addresses the cost of opportunism by technology partners during foreign expansion (Anderson & Gatignon, 1986; Hennart, 1988; Williamson, 1975). Further, it considers the costs of teaching a tacit technology to an outside organization. For example, Teece (1977), studying 26 cases of international technology transfer, found transfer costs to be significant. Further, Kogut and Zander (1993) suggest that when technology is less codifiable and teachable or more complex, companies are more prone to use a wholly owned subsidiary than a joint venture to transfer the technology.

But companies have multiple technologies of which some are more valuable to them than others (Prahalad & Hamel, 1990). When considering *whether* and *which* technology to

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