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The relationship of foreign R&D units in Taiwan and the Taiwanese knowledge-flow system

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Abstract

In the development of knowledge-based economies there are two important issues of concern: one is the extent to which knowledge is shared or diffused and the second is the direction of the diffusion or flow. As globalization of technology increases, multinational enterprises (MNEs) require rapid growth of overseas research and development (R&D) capacity. This leads to two trends: the establishment of overseas R&D facilities and sharing knowledge within host countries. This paper investigated the R&D programs and facilities of foreign firms based in Taiwan and their impact on the flow of knowledge in Taiwan. The major findings reported suggest that the strategic importance of the Taiwanese market is the dominant reason for MNEs to establish overseas R&D units in Taiwan. In addition, foreign R&D investment had a significant impact on Taiwan's knowledge-flow system. From these results some policy suggestions are offered, and implications for future research described. © 2002 Elsevier Science Ltd. All rights reserved.

Keywords: Multinational enterprises (MNEs); Overseas R&D organizations; Knowledge flow

1. Introduction

Contemporary studies of R&D activities of multinational enterprises (MNEs) focus on internationalization motives, R&D organizational structure, tasks and performance (Howells, 1990; Meyer, 1993; Nobel and Birkinshaw, 1998; Gassmann and von Zedtwitz, 1999). In addition, much of the literature discusses MNEs'

location selection and organizational strategy for their overseas R&D activities. Few discuss the impact of MNEs' overseas R&D activities on the development of technology in the host country. From the perspective of developing countries a major concern is how to attract MNEs and to encourage their investment in R&D activities in the indigenous country. To the extent that they are successful, the outcome of the R&D activities can enhance the diffusion and flow of knowledge, which will in turn support the country's national innovation system (NIS) (Fagerber, 1998; Reeve and Piric, 1998).

The recent rapid growth of Taiwan's economy demonstrates its investment potential. The primary incentive for foreign investors is now Taiwan's indigenous market. This in turn requires foreign investors to establish R&D units in Taiwan for new products and product adaptations that can respond to the diverse needs of Taiwanese consumers. As a consequence of governmental

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investment in education and related policies, Taiwan has sizable human resources in science and technology. In a number of technologically advanced industries Taiwan's manufacturing capacity can already compete successfully at the international level which in turn can enhance the strategic position of MNEs in the global economy (Reddy and Sigurdson, 1997). For these reasons, foreign-firm R&D activities in Taiwan are growing rapidly. Some well-known MNEs, such as Motorola, Toyota and Panasonic, have set up advanced R&D units in Taiwan. In the future it is likely that many more foreign firms will set up R&D units in Taiwan whose nature and tasks will tend to greater diversity, which could have an enormous impact on the strategy of individual firms as well as on the macro-economy of Taiwan.

This paper examines foreign R&D activities in Taiwan from the perspectives of how MNEs decide to develop R&D activities in Taiwan, what motivates these decisions in the context of the MNEs' R&D strategy, the particular tasks of MNEs' R&D institutes in Taiwan, as well as R&D management. These questions are clearly relevant to the relationship between knowledge flow and diffusion and the knowledge acquisition and technical innovation of domestic firms.

This paper reports a comprehensive theoretical and empirical study of the effects of foreign R&D organizational units in Taiwan. The major research questions of this study are:

1. What are the characteristics of foreign R&D organization set-up in Taiwan?
2. What factors influence foreign firms to set up R&D units in Taiwan?
3. What impact do various foreign R&D units have on Taiwan's knowledge-flow system?

2. Literature review and conceptual framework

2.1. Decisive factors for MNEs setting up overseas R&D units

Some of the factors that can influence MNEs' overseas R&D investment have been deduced from interviews or surveys (Meyer and Mizushima, 1989; Howells, 1990; Bresman et al., 1999) or from the existing theoretical literature (Pearson et al., 1993; Cheng and Bolon, 1993; Odagiri and Yasuda, 1996). These factors include global strategic considerations, market potential, technology transference, technology and human resource acquisition, policy orientation of indigenous government, and environmental factors (Meyer and Mizushima, 1989; Dunning, 1994; Odagiri and Yasuda, 1996; Reddy and Sigurdson, 1997; Gassmann and von Zedtwitz, 1998; Cantwell and Jane, 2000).

Although Taiwan's local market is limited, Taiwan plays the role of a bridge to Mainland China and Southeast Asia. Thus, if an MNE chooses Taiwan as its regional headquarters, the regional market could be an important motive for the MNE to introduce R&D activities in Taiwan. In certain manufacturing domains Taiwan dominates the information industry. Technology acquisition may consequently be one motive for an MNE to invest in R&D in Taiwan. With excellent education in technology, wages below those of advanced industrial countries, and positive policy incentives for R&D, Taiwan has significant cost benefits for R&D investment. These conditions describe one of the motives for MNEs to establish R&D activities in Taiwan. This paper categorizes MNEs' R&D investment motives in Taiwan into three parts:

1. *Market factors*: to satisfy Taiwanese or Asian consumer needs, MNEs establish R&D units or invest in R&D projects in Taiwan in order to develop, improve, or respond to local conditions.
2. *Technology factors*: the development of specific technology domains in Taiwan provides a base for implementing a global strategy. Therefore, MNEs assign Taiwan a role in specific technology development.
3. *Efficiency factors*: to take advantage of low-cost, high-quality technological human resources and governmental policy, MNEs invest in R&D in Taiwan.

Foreign firms in Taiwan (including joint ventures with indigenous firms) are the primary focus of this study. An MNE's percentage ownership strategy in Taiwan also reflects the MNE's degree of commitment to the Taiwanese market. In other words, higher ownership percentage gives an MNE more autonomy in the Taiwanese market. With higher control, MNEs will tend to invest more in R&D by establishing R&D departments in Taiwan (Meyer, 1993; Odagiri and Yasuda, 1996; Medcof, 1997; Kuemmerle, 1999; Cantwell and Jane, 2000).

Finally, the strategic importance of an MNE's branch in Taiwan also directly or indirectly influences the MNE's commitment to Taiwan R&D activity (Taggart, 1998; Boghani et al., 1999). If MNEs perceive Taiwan as an important base for their global strategy, MNEs will also increase their commitment to Taiwan R&D.

Therefore, this study considers the following possible reasons for MNEs to invest in R&D activity in Taiwan: (1) market factor, (2) technology factor, (3) efficiency factor, (4) higher ownership percentage, and (5) Taiwan strategic importance in an MNE's global strategy.

2.2. MNEs' overseas R&D organizational type

The types of overseas R&D units vary according to the tasks assigned by their parent MNEs (Pearson et al.,

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