

Factors affecting the choice of technology acquisition mode: An empirical analysis of the electronic firms of Japan, Korea and Taiwan

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Abstract

In today's globalized economy, enterprises are facing ever increasing competitive pressures. A commonly adopted strategy for gaining new technologies and remaining competitive is to acquire needed technology from external sources. The goal of this paper is to identify influential factors and their impact using a multi-factorial analysis of the choice of technology acquisition mode. The effect of various factors on these modes was studied by examining a sampling of the electronic industries of Japan, Korea and Taiwan. A patent analysis combined with Logit Regression is made and tested using data of these electronic firms. The results indicate that among the factors analyzed in this study, the technological capability (including technological level, technological innovation and research and development (R&D) activities) of a firm is the most significant factor in influencing the determination of the mode of technology acquisition. Finally, we discuss the significance of results based on resource theory and present our conclusions and their implications. By highlighting the important links between a firm's technological capability, size, previous experience and relevance of its core technology to the mode of technology acquisition in these technology-based firms, we hope to cast light on the contribution of various influential factors on the decision making of these modes for firms in these countries.

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1. Introduction

Survival in highly competitive markets requires producers to focus on important factors such as technological capability, product quality, adherence to standards and rapid response as the basis for competitive advantage. In an effort to meet these new demands, firms are deploying a range of innovations including advanced equipment and reconfiguration of business models. Competitive advantage derives not solely from firm-level resources, but also from difficult-to-imitate technologies (Teece et al., 1997; Betz, 2003). Technology acquisition is one way to enable an industry to keep in touch with the latest trends of an accelerated technology, and has continued to be a popular strategy for corporate growth (Hagedoorn and Schakenraad, 1994). A major issue for an organization's strategy

concerns is therefore the question of how to acquire the needed technology (Steensma, 1996).

Technology acquisition (Kim and Ro, 1995; Narayanan, 1998; James et al., 1998; Cho and Yu, 2000; Jones et al., 2000; Ziedonis, 2004; Hemmert, 2004; Girma, 2005; Kiyota and Okazaki, 2005; Poon and MacPherson, 2005) can be defined as a process of planned, selective, focalized importation of advanced technology which the enterprise has not nor did not master, and new application of imported technology which can bring expectant economic benefits to new users (Lambe and Spekman, 1997; Lowe and Taylor, 1998). As a component of its technology strategy, the firm should choose the appropriate mode for acquiring the needed technology; i.e., all available options to a firm should be carefully considered when deciding the mode of technology acquisition (Chesbrough, 2006; Chesbrough and Crowther, 2006). Because of the nature of technology, technology acquisition is not as simple as the purchase of a capital good or the acquisition of its blueprint. Recipients are normally obliged to devote

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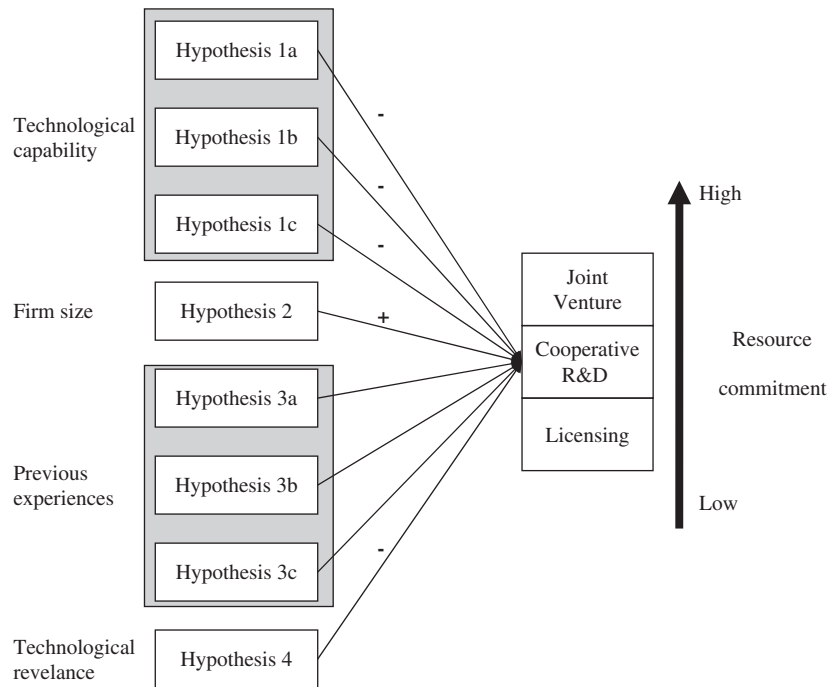


Fig. 1. Specification of investigated model.

substantial resources to assimilate, adapt, and improve upon the original technology (Barney, 1991). Therefore, to the extent that technical knowledge is limited in terms of understanding, availability and tacitness, successful use is commonly dependent upon firms and countries developing their own technological capabilities (Cohen and Levinthal, 1990).

Although some research has been done in this area, limitations have been found in the choice of modes: (1) using only one or a few factors (Davidson and McFetridge, 1985; Friedman, 1998; Durrani et al., 1999; Gopalakrishnan and Santoro, 2004; Howells et al., 2004; Kiyota and Okazaki, 2005; Yoshikawa, 2003), or (2) using choice as a function of internal technological capability (Jones et al., 2000; Veugelers, 1997). Hence, previous studies have not provided concrete results. While some results seem plausible and in accord with each other, others contradict each other and draw differing conclusions. Furthermore, most of these studies used survey data (Hemmert, 2004) for analysis, which might incorporate bias depending on how the surveys were completed.

This paper proposes an integrated framework to identify influential factors and their impact using a multi-factorial analysis in the choice of technology acquisition mode (Cho and Yu, 2000; Baines, 2004). There are a number of ways of acquiring technologies, of which three, licensing, cooperative research and development (R&D) and joint venture, were considered in this study. They form a continuum in terms of resource commitments (Hill et al., 1990) demanded from the acquirer (Fig. 1). Barney (1991) categorized the resources as physical resources, human resources, and organizational resources. Physical resources

include tangible assets such as plants and equipment, and intangible assets such as brand names and patents. Human resources include the experience, skills and expertise of the staff, while organizational resources include culture, organizational structure, management, etc. (Tsang, 1997). Each resource consists of a bundle of potential productive services and these services, not the resources themselves, are the inputs in the production process (Penrose, 1959). Among the selected modes of technological transfers, licensing requires the smallest amount of resource commitment. Essentially, it is a non-equity mode of technological transfer and the acquirer needs to invest mostly staff time and attention (Kurokawa, 1997). On the other hand, the joint venture is an equity-based form of direct investment. The demand on a firm's resources should not be understated (Albert et al., 1990; Amit and Schoemaker, 1993). The resource commitment requirement for cooperative R&D falls somewhere between licensing and joint venture. Because strategic technology acquisitions (Lambe and Spekman, 1997; Lowe and Taylor, 1998; Narula and Hagedoorn, 1999; Russ and Camp, 1997; Ruckman, 2005) play a central role for most firms in high-industries such as electronic firms, it is quite important for them to have a solid theoretical base for planning and analyzing various aspects of acquisition activity.

The contents of this study are as follows: An analytical framework for the technology acquisition mode is suggested and a set of hypothesis is developed based on this. Analysis of data from the electronic sectors of Japan, Korea and Taiwan is conducted with Logit Regression analysis for identifying influential factors and their impact. In contrast to most of the previous studies, which used

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