Determinants of successful R&D cooperation in Japanese small businesses: The impact of organizational and contractual characteristics

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Abstract

Using original survey data on Japanese small businesses, this paper analyses the impact of the organizational and contractual characteristics of cooperative R&D, such as membership structure, partner relationship, external support, and rules of cost and outcome sharing, on the probability of the technological and commercial success of the project. Empirical results suggest that cooperative R&D is more successful, the higher the quality and quantity of external resources available through cooperation, and the lower the transaction and coordination costs required for such arrangements. Moreover, we found that the determinants of technological and commercial success differ considerably.

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1. Introduction

Cooperative R&D1 has attracted considerable attention from both academics and practitioners. Important theoretical literature on this subject highlight the following advantages of cooperative R&D: better access to external business resources, achieving economies of scale and scope and synergy effects for R&D, reducing risk and wasteful duplication of R&D efforts, and increased incentive for R&D investment by the reduced appropriability problem (Katz, 1986; d’Aspremont and Jacquemin, 1988; Suzumura, 1992; Combs, 1993). On the other hand, cooperative R&D is also argued to have the negative effects of welfare loss or reduced R&D efforts if it leads to collusion in R&D and the product market (Jorde and Teece, 1990).

Cooperative R&D is a useful way to overcome the lack of internal business resources and to improve innovativeness and competitiveness, particularly for small and medium enterprises (SMEs). In fact, as pointed out by Kleinknecht and Reijnen (1992, p. 347), “R&D cooperation does not typically occur between big, high tech firms.” A statistical survey carried out in Japan in 19912 revealed that 9% of SMEs (firms with 50–299

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1 Based on the aims and objectives of their studies, scholars of this topic refer to cooperation in R&D differently—cooperative R&D, research partnership, research joint venture (RVJ), and research consortia. In this paper, we mostly use the word “cooperative R&D.”

2 This is the first, and thus far, the last official statistics in Japan that shows the number of cooperating firms by firm size classes.
employees\(^3\) in the manufacturing sector were involved in cooperative R&D with other firms (Table 1). Compared to large firms, the ratio of SMEs with cooperative R&D is lower but is still too high to be neglected. It should be noted that, in absolute terms, more SMEs cooperate in R&D than large firms. Moreover, cooperative R&D is not concentrated in a small number of high-tech industries but is found in all manufacturing industries.

The aim of this paper is to analyze the impact of the organizational and contractual features of cooperative R&D on project performance by using original survey data of Japanese SMEs in the manufacturing sector. This paper contributes to the study of cooperative R&D in two major ways. First, few empirical studies have been conducted on the impact of the organizational and contractual characteristics of cooperative R&D thus far.\(^4\) Second, previous empirical researches have concentrated on research consortia among large firms and paid relatively slight attention to SMEs. In particular, econometric studies based on Japanese data have primarily focused on government-sponsored research consortia among large corporations (Miyata, 1995; Branstetter and Sakakibara, 1998, 2002; Sakakibara, 2001a,b). This study is the first comprehensive empirical study on cooperative R&D projects of Japanese SMEs.

The remainder of this paper is organized as follows. The next section provides a review of previous empirical

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\(^3\) Firms with less than 50 employees have been excluded from this survey.

\(^4\) See Hagedoorn et al. (2000) and Link and Siegel (2003), chapter 11, for recent surveys of related theoretical and empirical literature.
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