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Internal and external discipline: The effect of project leadership and government monitoring on the performance of publicly funded R&D consortia

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ABSTRACT

R&D consortia have been regarded as an effective means of promoting innovation. Several R&D consortia obtain public financial support, which may affect their governance structure and performance. This study investigates the governance mechanisms of publicly funded R&D consortia and their effects on innovation performance. Few studies have empirically addressed the effect of project monitoring by the government or the role of project leadership in R&D consortia. Focusing on a major support program for R&D consortia in Japan and using a sample of 251 firms that participated in publicly funded R&D consortia from 2004 to 2009, we empirically confirm that to enhance firms' innovation performance, both project leadership as internal discipline and government monitoring as external discipline matter. Our results show that project leadership directly improves firms' innovation performance, while firms' commitment indirectly affects performance. Project leadership and government monitoring also promote commitment. Furthermore, both factors are complementary: consortia members are more willing to accept a project leader's coordination under stricter government monitoring.

1. Introduction

Much of the economics of organizations deals with the formal rights and rules governing organizations such as authority and contracting (Hermalin, 2013). However, it is inherently difficult to provide incentives for innovative activity using formal contracts and rules (Holmstrom, 1989). In this sense, project organization operations are critically determined by leadership and monitoring. Leadership is about motivating and leading project participants to realize their potential and achieve tougher and more challenging organizational missions (Anantamula, 2010; Hermalin, 2013). Monitoring is essential for restraining moral hazard and discouraging opportunistic behavior among project participants, especially in the absence of incentive contracts (Holmstrom, 1989; Matt et al., 2012; Tripsas et al., 1995).

Collaborative R&D projects among private firms, universities, and public research institutes (hereafter R&D consortia) have attracted increasing attention internationally as an effective means of promoting innovation (Etzkowitz and Leydesdorff, 2000; Hemmert et al., 2014). Efficient governance of R&D consortia is a particularly difficult task because they include both academic and business partners with different interests and incentives (Bjerregaard, 2010; Bruneel et al., 2010;

Das and Teng, 1998). Free-riding and opportunistic behavior may also occur. Therefore, R&D consortia governance affects innovation performance (Mora-Valentin et al., 2004; Morandi, 2013).

However, few studies have empirically addressed the effect of project governance for R&D consortia, specifically the effect of project monitoring by the government. Moreover, the literature on innovation management has long recognized the role of innovation champions in private R&D (e.g. Chakrabarti, 1974), though the role of project leadership in R&D consortia remains poorly explored. Therefore, this study empirically examines the determinants of firms' innovation performance when participating in publicly funded R&D consortia using original survey data and with focus on the effects of project leadership and public monitoring.

This study concentrates on how the roles the project leader plays (project planning, progress control, and coordination) contribute to firms' innovation performance. Another key question is how the level of government monitoring with regard to progress control as well as project evaluation affect performance. We further analyze whether project leadership and government monitoring increase firms' commitment, which in turn may boost their innovation performance, while both factors may also directly enhance performance. Capturing the

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mediating effect of commitment on innovation performance allows a quantitative comparison of the direct effect of project leadership and government monitoring and their indirect effects via commitment. In this way, we investigate the contributions of both aspects to innovation.

In Japan, public support for collaborative R&D projects has concentrated on those among large private firms in the same industry since the early 1960s (for example, Sakakibara, 1997, 2001). However, under the Science and Technology Basic Plan, the Japanese government initiated financial support for R&D consortia in 1997 with the “Consortium R&D Project for Regional Revitalization” (CRDP) implemented by the Ministry of Economy, Trade and Industry (METI) for 11 fiscal years until 2007.¹ This study focuses on this program, not only because it was one of the first and major public support programs for R&D consortia in Japan targeting SMEs, but also because it was based on a commissioned R&D contract with METI, which represents an important aspect of project governance.

In terms of project governance, publicly funded R&D consortia have two distinguishing contractual aspects. The government (METI) concludes a commissioned research contract for two years with the project management organization, which in turn is expected to coordinate the consortia, concluding joint research contracts with all project members. METI selects R&D consortia for financial support based on project proposals and evaluates the performance of subsidized projects after the first year (midterm evaluation) and the second year (final evaluation). Thus, both project leadership and public monitoring may be important for project performance, as means of applying internal and external discipline.²

The remainder of this paper is organized as follows. In the next section, we provide a brief review of the related literature. In Section 3, we describe the focal support program, CRDP, in more detail. In Section 4, we present our conceptual framework and hypotheses for empirical estimation. In Section 5, we explain the data, sample, and estimation models. Section 6 presents the results and the related discussion. Section 7 concludes with contributions, limitations, and opportunities for future research.

2. Literature review

Most studies have investigated the effect of R&D consortia participation (Eom and Lee, 2010; George et al., 2002; Motohashi, 2005; Zucker and Darby, 2001) and public support for R&D on innovation outcomes (Czarnitzki et al., 2007; Klette et al., 2000). These studies often demonstrate the positive effect of participation in R&D consortia compared to the performance of non-participants due to the complementarity or knowledge spillovers among participants.

Recent research by Nishimura and Okamuro (2016) examines the firm-level spillover effects of R&D consortia, including the benefits for customers of consortia members and finds that participants improved their performance as a result of knowledge spillovers. Furthermore, the consortia members’ business partners enjoyed indirect effects through their business transactions, including rent spillovers.

However, to the best of our knowledge, few studies have empirically addressed the effect of project organization or project governance on the performance of R&D consortia, though many argue that organizing such R&D cooperation influences innovation (e.g. Casper and Miozzo, 2013; Mora-Valentin et al., 2004; Morandi, 2013). For example, Morandi (2013) examines the coordination and control methods to motivate participants’ spirits in university-industry R&D collaboration (hereafter UIC), finding various combinations of management practices in UIC projects according to task uncertainty, equivocality, and

partners’ interdependence.

Furthermore, Okamuro (2007) examines how project characteristics such as contractual rules affect the technological and commercial success of inter-firm cooperative R&D projects but not that of R&D consortia including both private firms and universities. Okamuro and Nishimura (2013) explore the effect of universities’ intellectual property rights policy on R&D consortia performance. Hemmert et al. (2014) provide an international comparison between the US, Japan, and South Korea in terms of the effects of project characteristics on trust formation in the UIC, but not on project performance. These empirical studies, unfortunately, do not clarify the role of project leadership and government monitoring.

Both theoretical and empirical studies actively investigate contractual designs (Aghion and Tirole, 1994; Lerner and Malmendier, 2010; Lerner and Merges, 1998) and contractual modes (Hagedoorn and Heszen, 2007, 2009; Van de Vrande et al., 2006) in inter-firm R&D cooperative arrangements, though these do not apply directly to R&D consortia composed of private business and academia. In contrast, there are few formal theories related to R&D consortia, and few empirical studies investigating governance and contractual frameworks within R&D consortia.³

The literature on innovation management especially has long recognized the role of innovation champions in private R&D (e.g. Chakrabarti, 1974; Hemmert et al., 2014), but the role of project leadership in R&D consortia remains poorly explored in econometric studies due to data constraints. According to Hermalin (2013), much of the economics of organization deals with the formal rights and rules that govern organizations, such as authority and contracts, though operations are also determined by informal aspects such as project leadership.

Some studies in the management literature address the roles of project leadership and their effects (Anantatmula, 2010; Chaudhry et al., 2012), though these are mainly case studies or use very small samples. For example, Anantatmula (2010) uses 69 interviews with project management professionals to construct a project manager model and to identify the effective roles of project leaders—however, the study did not provide an empirical examination of the relationship between project leadership and innovation performance.

Moreover, few researchers look into the effect of government monitoring, although we could expect that project monitoring would have a significant impact on project participants’ behavior and their performance from the behavioral additionality viewpoint. Regarding the role of government, the literature on behavioral additionality notes the effect of public intervention on subsidy recipients’ behavior, especially in terms of the direction and management of R&D collaboration (Clarysse et al., 2009; Drivas and Economidou, 2013; Falk, 2007; Georghiou, 2002). However, compared to the large body of research on input and output additionality, there is little empirical research into behavioral additionality.

To the best of our knowledge, Tripsas et al. (1995) argue that public intervention in R&D consortia reduces participants’ opportunistic behavior. However, they did not directly investigate the government’s role in controlling participants’ opportunistic behavior or provide empirical evidence related to the impact of public support for R&D consortia on innovation performance.⁴ Okamuro and Nishimura (2015) recently find that public subsidies for R&D consortia promotes trust formation among participants and thus increases project performance, though without explicitly considering the role of government monitoring and evaluation due to data constraints.

Most previous empirical studies focus on the effect of participation

¹ METI renewed the CRDP in 2008 as the “Regional Innovation R&D Program.”

² Internal discipline refers to the role of the project leader, while external discipline includes project monitoring and evaluation by the government. Sections 3 and 4 describe this in more detail.

³ Perkmann and Walsh (2007) indicate the organization and governance of UICs at the individual, organizational, and institutional levels as a main agenda for further research.

⁴ Matt et al. (2012) also find that publicly funded R&D collaborations are less likely to cause serious internal conflicts than spontaneous (non-publicly funded) collaborations. However, they focus on inter-firm collaborations rather than R&D consortia.

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