



The bumpy road of technology partnerships: Understanding causes and consequences of partnership mal-functioning

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ABSTRACT

Research on technological partnerships has traditionally sought explanation of their high failure rates in partner characteristics and relationship features. This study introduces the notion of a 'bumpy road' in technology partnerships which refers to undesired outcomes such as 'partnership mal-functioning' and 'instability' to the degree to which innovation activities are hampered. We explain how firm-level strategies can reduce the probability of a 'bumpy road' in partnerships. We also assess the impact of this 'bumpy road' on innovative performance. We find that firms that excel in diversification of external activities (in terms of different types of partners) perform best. Moreover, a persistent product oriented innovation strategy geared at developing new products, new markets, or higher product quality will yield more stable partnership outcomes. Our results confirm that engagement in partnerships is beneficial for innovative performance. However, firms that experienced a 'bumpy road' in their technological partnerships have to pay a price in terms of a negative effect on their innovative performance.

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1. Introduction

Failure is a frequent outcome of inter-firm partnering (Park and Ungson, 2001). High failure rates of 30–50% in partnerships are not an uncommon finding in the literature (e.g., Bleeke and Ernst, 1991; Harrigan, 1988a,b; Killing, 1988). Especially technology partnerships, where firms' exchange technology and jointly perform R&D in the context of complex intellectual property regimes, are inherently difficult to manage and hence this type of partnership is subject to the highest rates of failure (see, for example, Sadowski et al., 2005).

Partnerships can be unsuccessful for various reasons. Prior research sought explanations for this phenomenon from the perspective of several theoretical approaches (see Das and Teng, 2000a for a literature overview). Transaction cost economics stresses the pursuit of self-interest at the expense of the partner as well as the high costs of deterring such opportunistic behavior as a major cause of partnership instability (Williamson, 1985; Gulati, 1995). Game-theoretic approaches emphasize the role of uncer-

tainty in predicting the intentions of partners and future payoffs (Parkhe, 1993a). The resource-based view suggests that inequality in resources that firms bring into a partnership gives rise to an eventual power imbalance between partners that can lead to a premature termination of their partnership (Bucklin and Sengupta, 1993; Das and Teng, 2000b; Osborn and Baughn, 1990). From the perspective of a strategic behavior approach, the literature points at the role of inter-firm rivalry and competition that increases the likelihood of partnership instability (Porter, 1985, 1990; Kotug, 1989).

The literature also indicates that partnerships are motivated by the need to share both risks and costs of R&D, to gain access to new technology and new markets, and to create synergetic effects (Hagedoorn, 1993). However, successful partnerships between competitors are expected to be rare because often achievement of these goals proves unrealistic, leading to a premature termination of a partnership (Porter, 1990). Partnerships with substantial overlap in core businesses, geographic markets, and functional skills are reported to have success rates of about 30% as competitors are inclined to maximize their own individual objectives rather than their collaborative interests. Moreover, managerial complexity of these joint activities induces a higher probability of partnership failure (Park and Ungson, 2001). In a partnership, two or more independent firms need to be coordinated and also the activities of the partnership have to be aligned with the parent firms' interests. This coordination may be cumbersome due to, for instance, cultural and organizational differences between partners turning partnership demise into a likely outcome (Parkhe, 1993b).

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So far, the existing literature has seldom adhered to a uniform terminology when describing partnership outcomes. When assessing the positive performance of partnerships objective performance measures (e.g., sales growth, profitability, and return on assets) can be used or, alternatively, survey data can be employed where managers are asked directly to assess the performance of a partnership. For the assessment of less successful partnership outcomes, terms like 'failure', 'premature termination', 'dissolution' and 'instability' have been used interchangeably to indicate unfavorable results of a partnership (see Das and Teng, 2000a; Park and Ungson, 2001 for overviews). In our study we take a combination of these two approaches as we consider both the functioning and the results of technology partnerships.

We employ a measure of firms experiencing a 'bumpy road' in their technology partnerships related to the notion of partnership instability as discussed by Das and Teng (2000a). We focus on firms that experienced a 'bumpy road' in their technology partnerships when unplanned outcomes such as stoppage, delay or abandonment of their joint innovation project(s) occurred. A somewhat similar approach has been recently adopted in Lhuillery and Pfister (2009). Our analysis deviates from their approach in a number of ways. First, we intentionally adopt a broader definition than simply premature partnership dissolution, by also analyzing those events when firms had difficulty-laden or even unproductive partnerships. We do so to explore a broader issue of what factors and firm strategies can reduce the probability of things going wrong in partnerships. Cooperation that results in a failure is only one instance of this broader mal-functioning of partnerships. Second, in the context of this broader perception of the mal-functioning of partnerships as their 'bumpy road', we investigate whether firms that employ a persistent innovation strategy geared at either reducing cost or developing new products face a lower probability of such a 'bumpy road' in their technology partnerships. Third, we consider whether there is an inverse relationship between the diversity and breadth in the partnership portfolio of firms and the probability of their partnership mal-functioning. Finally, in our analysis we look at the effect that the 'bumpy road' in the technological partnerships of firms might have on their future innovative performance.

In the following, we study persistence in the overall firm's business strategy with respect to firm's innovative activities (product oriented vs. cost oriented) and in terms of firm's alliance strategy. Our approach follows the definition of persistence as 'state dependence' (e.g., Heckman, 1981), which in our context means that firms are studied from the perspective of both their past innovation activities/partnerships and their current continuation of these activities. A similar approach has been used to analyze persistence in profits (Mueller, 1977; McGahan and Porter, 2003), innovation (Roberts, 1999; Raymond et al., 2010) or other measures of firm performance such as Tobin's q (Villalonga, 2004). In these studies, persistence is also understood in terms of a relation between the 'current state' of a firm (in terms of its strategy or performance) and the 'past states' for the same dimension of its activities.

To test our hypotheses we employ three consecutive streams of data for the period 1994–2000 collected through the Community Innovation Survey (CIS). The CIS survey is organized by Eurostat and is aimed at collecting information on firms' innovating activities. The survey covers both large R&D performing firms as well as smaller innovating firms with a limited number of technology partnerships.

The paper proceeds as follows. The next section presents the theoretical framework and derives hypotheses. We then describe the data, variables and methods. This is followed by a presentation of the results, the final section discusses these results and it presents the conclusions.

2. Hypotheses

2.1. Innovation strategy, partnership portfolio and a 'bumpy road'

Innovation activities relate to different objectives, such as a cost-oriented process innovation objective or a demand enhancing product innovation objective, and the pursuit of these different innovation objectives requires distinct firm capabilities. Such capabilities are further developed by routinely executing related activities persistently over an extended period of time (Nelson and Winter, 1982). Firm capabilities that are gradually accumulated through the repeated execution of similar activities may become a source of a firm's competitive advantage if these accumulated capabilities enable a firm to differentiate itself from its competitors (Barney, 1991; Diez-Vial, 2007; Hoetker, 2005).

We also note that innovations in products are inherently more uncertain than innovations that are cost related (Boer and During, 2001; Freeman and Soete, 1997). When, as in our paper, innovations in products entail the replacement of obsolete products, improvement of product quality, expanding the product range and extending the product market range, they have an explorative character. Such product innovation projects are rife with uncertainty and often the direction of this explorative search is unclear. Also, a possible partner for joint activities may be hard to identify. This uncertainty may be countered with a persistent product innovation strategy. If such a strategy is conducted repeatedly over time the firm gets a better notion of its technological possibilities and a better understanding of the future trends in consumer demands, which facilitates identification of future products and their attributes.

In the context of this persistent product innovation strategy, the goal of partnerships may be set with both higher clarity and higher commitment and this may help the stability of the individual partnership. When objectives are unclear at the start of a partnership this may lead to various changes made while this partnership is still ongoing. This is detrimental to the functioning of a technology partnership as demonstrated by Sadowski et al. (2005) who report that changes in the priorities and the strategy of firms, related to technology partnerships, is the most frequently mentioned reason for partnership termination (in nearly 53% of all cases). Also, a more persistent product innovation strategy may be helpful in determining proper partnership candidates for future projects. A more persistent strategy may assist identifying which competences a firm lacks and hence hint at which partners may fill the gaps in specific resources. Again this may aid in clearly identifying the objectives of partnerships and contribute to a lower likelihood of a malfunctioning partnership.

In sum, we expect that firms that persistently follow an innovation strategy, based on a product-focus, are less likely to encounter a bumpy road in their partnerships due to the accumulated and refined capabilities necessary for the execution of a strategy which leads to a lower probability of making mistakes in managing these partnerships. This suggests the following hypothesis:

Hypothesis 1. Conducting a persistent innovation strategy, characterized by product focus, reduces the probability of a 'bumpy road' for a firm's technology partnerships.

When innovation has a cost focus the goal is to increase efficiency in production processes, to reduce the cost of labor and materials, the use of energy, and to comply with government regulations on product standards and reduction of environmental impact. The nature of this type of process innovation is exploitative and in general the amount of uncertainty involved in exploitation is considerable but it is much less so than the uncertainty surrounding exploration. Still a persistent process innovation strategy based on cost focus may help in reducing the amount of uncertainty in terms of goal selection and partner choice, though the benefits are

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