Inter-Organizational Relationships and Firm Performance: Impact of Complementary Knowledge and Relative Absorptive Capacity

Dev K Dutta
University of New Hampshire

In this paper, we examine the phenomenon of dyadic inter-organizational relationships and develop a conceptual model to explain the influence of complementary knowledge and relative absorptive capacity on firm performance. Using theoretical perspectives emanating from the knowledge-based view of the firm and organizational learning, we suggest that performance outcomes in inter-organizational relationships depend on both stock and flow of knowledge - related to complementary knowledge and relative absorptive capacity of the firm, respectively.

INTRODUCTION

In the hypercompetitive business environment facing most firms today (D'Aveni, 1994), inter-organizational relationships have emerged as a favored choice of firms to build and sustain competitive advantage (Smith, Carroll and Ashford, 1995). Inter-organizational relationships provide a unique source of value to firms, and their utility has been examined from more than one theoretical perspective (Auster, 1994; Barringer and Harrison, 2000). Among these, organizational learning provides a useful perspective on why firms engage in inter-organizational relationships (Barringer and Harrison, 2000). Firms are social communities engaged in the creation and transfer of knowledge. Any effort at technology sourcing or transfer may be viewed as a way of transforming knowledge into economically rewarded products or services (Kogut, 2000; Kogut and Zander, 1993). As knowledge becomes an important resource for firms (Grant, 1996; Spender, 1996), the firm increasingly considers sourcing valuable knowledge not available within the firm from networks in which the firm is embedded (Mody, 1993; Shan, 1990). Networks have been viewed as being an arrangement between markets and hierarchies (Thorelli, 1996). Therefore, firms use inter-organizational relationships as an effective means for exchanging intangible resources, which by their very nature are difficult to procure from or trade in the market.

However, despite the obvious advantages associated with inter-organizational linkages, these relationships may not always work out for firms. Singh and Mitchell (1996) find that even though businesses benefit by forming alliances, they may become too dependent on them; the risk of business failure increases significantly in case the partnership fails when one or both partners go out of business or otherwise leave the partnership. Any relationship has a potential for becoming successful when it is synergistic and offers something of value to both the partners. Equally, such a relationship is sustained if both the partners are able to take benefit of the arrangement. Nielsen (2005) suggests that synergies associated with knowledge-relating capabilities can improve performance by enhancing the innovative abilities of strategic alliances. In line with the organizational learning approach, an inter-organizational relationship has the greatest chance of being successful if it offers valuable knowledge to *both* partners and if both partners are able to continually *learn* from the experience. Therefore, the two research questions we ask in this paper are: (i) what kind of knowledge exchange is most beneficial for firms engaged in inter-organizational relationships? (ii) what are the possible additional influences on this process of knowledge exchange, as firms engage in learning from their partners?

In answering these questions, our paper makes several contributions. First, we suggest that when inter-organizational relationships are viewed through a learning perspective, two factors that assume critical importance in influencing firm performance are the partners' complementary knowledge and relative absorptive capacities. Second, by combining both complementary knowledge and relative absorptive capacity into our conceptual model, we offer integration between the knowledge-based view of the firm and the organizational learning approach towards achieving competitive advantage. Finally, by considering both stock (complementary knowledge) and flow (relative absorptive capacity) aspects of knowledge in our model, we indicate that the process of sustaining firm performance based on inter-organizational relationships is a highly dynamic process that evolves over time.

BENEFITS OF INTER-ORGANIZATIONAL RELATIONSHIPS

An inter-organizational relationship is any formal or semi-formal arrangement between two or more firms, which provides each participant with a benefit from the collaboration that is either not available or is prohibitively expensive to procure from the market or to develop in-house. Barringer and Harrison (2000) suggest that an inter-organizational relationship can occur in one of several forms – joint ventures, network structures, consortia, alliances, trade associations, and interlocking directorates. While theoretically an inter-organizational relationship can form between two or more firms and incorporate varying degrees of formalization, for the purpose of this paper we restrict our consideration of inter-organizational relationships to a formal or semi-formal dyadic arrangement between two partner firms.

The reasons why firms develop inter-organizational relationships have been explored in prior literature based on a number of theoretical perspectives. It has been suggested that these partnerships enable firms to acquire resources and manage uncertainty (resource dependence perspective), reduce transaction costs while accounting for asset specificity, opportunism and small numbers bargaining (transaction cost economics), provide competitive benefits based on firm positioning and profitability (strategic choice perspective), help firms survive and grow (ecological perspective), acquire legitimacy (institutional theory), and align interests with other stakeholders in the environment (stakeholder theory) (Auster, 1994; Barringer and Harrison, 2000; Harrison, Hitt, Hoskisson and Ireland, 2001).

Specifically, in terms of enhancing performance and building competitive advantage, an inter-organizational relationship provides a firm with a number of benefits. Based on their longitudinal study of 1903 competitive moves undertaken in the software industry, Young, Smith and Grimm (1996) note that as the number of horizontal cooperative arrangements engaged in by a firm expands, the firm's performance improves. Appleyard (1996) finds that even in fiercely competitive industries, firms use a plethora of mechanisms - both public and private - for the purpose of inter-firm knowledge sharing. Network ties between organizations allow for learning between partners. This helps the firm to reduce environmental uncertainty and facilitate organizational adaptation (Kraatz, 1998). Powell, Koput and Smith-Doerr (1996) suggest that in industries characterized by a complex and rapidly expanding knowledge base and with dispersed nodes of expertise (e.g. biotechnology), the locus of innovation is found within networks of firms rather than in individual firms. This does not mean that these firms are not competitors in the traditional sense of the term. What this indicates, however, is that to build and sustain competitive advantage firms make choices, which enable them to balance external competitive pressures vis-à-vis internal needs for developing capabilities or building competence. In fact, a firm's position in the network as well as its positioning vis-à-vis other players in the network create resource asymmetries. This, in turn, influences the flow of assets, knowledge and information within the network as well as shifts in status of incumbent firms, thus leading to continuous configuration and reconfiguration of competitive positions (Gnyawali and Madhavan, 2001). It is, therefore, natural that in order to consolidate their competitive positioning in the industry, firms will take recourse to entering networks and/or involve in inter-organizational partnerships with other players.

Inter-organizational relationships improve a partner firm's competitive position by allowing for cost minimization of transactions while maintaining flexibility (Park, 1996). Based on an embeddedness perspective, McEvily and Zaheer (1999) suggest that sources of combinative capabilities of firms can lie outside their organizational boundaries or more specifically in their network resources comprising bridging ties and relationships with other firms in the external environment where the firm is embedded. Specifically, in industries characterized by open systems architecture and network technologies (such as Sun Microsystem's Open Systems Strategy) there is evidence that collaborative partnerships and sharing of technical knowledge with competitors and even facilitation of market entry by them helps the firm in question in the long term (Garud and Kumaraswamy, 1993). Combs and Ketchen's (1999) study found that firms tend to go for cooperative mechanisms to build resources in the long-term despite the unfavorable exchange conditions it might bring in the short run. In fact, this occurs because many of the resources available and used by a firm may not strictly lie within the firm boundaries and are increasingly be found outside of the firm (Dyer and Singh, 1998).

If we consider inter-organizational relationships from the organizational learning perspective, it becomes obvious that knowledge sharing between the partners will form the fulcrum of such relationships. This may be knowledge as the prime resource that exchanges hands or knowledge associated with other tangible resources transferred between partners. Also, in any exchange of knowledge between partners will lead to learning, which will be based on the partners' individual capacities to absorb knowledge and learn. Therefore, we suggest that the impact of an inter-organizational relationship on performance enhancement for the incumbent firm would depend on two critical parameters. Firstly, characteristics associated with complementary resources (or more specifically, complementary knowledge) shared between partner firms would have a relationship with firm performance. Secondly, the effectiveness of this relationship would depend not so much on the knowledge transferred but rather on the extent and effectiveness with which such knowledge is assimilated within the firm, based on its relative absorptive capacity.

COMPLEMENTARY ASSETS, COMPLEMENTARY KNOWLEDGE AND INTER-ORGANIZATIONAL RELATIONSHIPS

According to Dyer and Singh (1998), competitive advantage in inter-organizational relationships is derived based on: relation-specific assets, knowledge sharing routines, complementary resources/capabilities, and effective governance structures. The authors define complementary resource endowments as being "distinctive resources of alliance partners that collective generate greater rents than the sum of those obtained from the individual endowments of each partner" (p. 666-667). The basic assumption is that each partner brings to the alliance certain resources and capabilities, which when combined provide the partners with an overall resource endowment that is valuable, rare, inimitable and non-substitutable thus leading to competitive advantage.

However, following from Stuart's (2000) finding about a firm's resource profile being an important factor in the firm's alliance formation process, Harrison *et al* (2001) have argued that what matters is resource complementarity rather than resource similarity between the partners. This notion of complementary resources and capabilities follows from Teece's (1986) definition of complementary assets, which provide a firm with a capacity for innovation. Teece suggests that in the case of innovative efforts of firms, it is almost always seen that "… successful commercialization of an innovation requires that the know-how in question be utilized in conjunction with other capabilities or assets … [or] complementary assets which are specialized" (p. 288). According to Teece (1986; 1988), complementary assets are one of three kinds - generic, specialized or co-specialized. While generic assets do not need to be tailored in anyway to suit a specific innovation, the other two categories necessarily must be tailored or modified before they become amenable to use by the firm. Even here, specialized assets have a one-way dependence on innovation while co-specialized assets are such that they share a bi-directional dependence on the specific innovation.

In an inter-organizational relationship, each partner firm brings to the collaboration a mix of capabilities that are either scale capabilities or link capabilities. Dussauge, Garrette and Mitchell (2000) suggest that a scale alliance as one where the partners contribute similar capabilities while a link alliance is one where the partners bring different capabilities to the partnership. The notion of complementary assets becomes important in inter-organizational relationships because these are partnerships exclusively set up to capitalize on partner strengths and benefit from each other's possession of unique assets and capabilities.

Shenkar and Li (1999) find that in international cooperative ventures, firms engage in a knowledge-seeking behavior. Closely related to the notion of complementary assets, therefore, there exists a similar categorization with respect to the knowledge brought by the partners to the alliance. This is the notion of complementary knowledge. "The knowledge base of a firm/organization is constituted by a core and by a number of other types of knowledge, that can be called complementary," (Saviotti, 1998, p. 853). Dussauge, Garrette and Mitchell (2000) find that link alliances provide their partners with higher levels of learning and capability acquisition, which indicates that the knowledge associated with link alliances, is different from that associated with scale alliances. Since we have anchored our analysis on organizational learning as the chosen theoretical lens, we assume that complementary knowledge forms a subset – or indeed the core - of the broader category of complementary assets. Buckley and Carter (1999) argue that when two firms decide to form an inter-organizational relationship, they remain concerned about uncertainties that may arise out of the risk that managers and employees of each of the partnering organizations not combining their knowledge in the most optimum manner possible. In order to reduce this uncertainty, firms identify certain complementary knowledge or those "… items of knowledge [that] should be brought together, by developing efficient and effective methods of combination,… by deciding where and with whom the combined knowledge should be held" (p. 83).

Researchers have found that many firms devise strategies to share technological knowledge with partners, including competitors, since this serves to improve their performance on innovation (Spencer, 2003). Christmann (2000) goes as far as to suggest that the ability of firms to use best-practices to derive cost-advantage hinges on availability of complementary assets. And yet, not all firms lay emphasis on complementary assets (and more specifically, on complementary knowledge) in formulating their inter-organizational relationships. Thus, reasons such as mimetic isomorphism, political considerations and top management commitments may also give rise to formation of specific inter-organizational relationships by firms. However, it has been seen that firms that formulate their network strategy and inter-organizational relationships based on exploitation of complementary assets available with the partners perform better than firms that do not do so (Rothaermel, 2001). Therefore, we suggest that in case of inter-organizational relationships, complementary knowledge becomes an important antecedent of subsequent firm performance. Having access to and making effective use of this knowledge allows firms to truly synergize their alliance, reduce mutual risks and take advantage of each others' strengths and capabilities. Therefore, we suggest:

> *Proposition 1: All other things being equal, a firm that has an explicit focus on assimilating complementary knowledge through inter-organizational relationships will perform better than a firm that does not have this explicit focus.*

RELATIVE ABSORPTIVE CAPACITY AND INTER-ORGANIZATIONAL RELATIONSHIPS

Harrison *et al* (2001) argue that existence of complementary resources is a necessary but not a sufficient condition for achieving synergy in inter-organizational partnerships. Doz (1996) notes learning is critical in any strategic alliance. These partnerships become inertial or adaptive depending on whether they evolve with time, with the constituent partners engaging in cycles of learning, reevaluation and readjustment of strategic priorities. What becomes equally crucial is how firms are able to actually transform this learning and knowledge intake into improving their own performance outcomes. In their study of the impact of organizational knowledge on firm performance, Decarolis and Deeds (1999) find that both stocks and flows of knowledge affect firm performance. The authors consider firm citations, patents and products under development as being examples of knowledge stock and alliance partnerships and R&D investment as being examples of knowledge flow. Taking a closer look at the categorization of knowledge in an inter-organizational relationship, we can say that complementary knowledge would be an example of the firm's knowledge stock while the firm's absorptive capacity (Cohen and Levinthal, 1990), i.e. capacity to assimilate knowledge from its partners would be an example of knowledge flow. Saviotti (1998) suggests that there are degrees of appropriability associated with knowledge available to partner firms in inter-organizational relationships. Not only does this depend on the degree of knowledge tacitness – elements of knowledge closer to the technological frontier are newer and expected to be more tacit – but also on its codifiability and transferability. This indicates that other than the commonness of alliance partners in terms of the availability of their complementary knowledge, what also becomes important are the firms' respective absorptive capacities.

Being the capacity to learn from other firms, absorptive capacity is path dependent, based as it is on the firm's previous cumulative learning efforts and investment made by it in processes connected with knowledge accumulation and management. With respect to the influence of absorptive capacity on performance outcomes in inter-organizational relationships, prior studies reveal mixed results. In their study of 792 alliances worldwide, Mowery, Oxley and Silverman (1996) find some support in general that absorptive capacity is important with regard to the firm's ability to extract technical capabilities from its alliance partners. Yet, they also find that these results seem to be tempered for large firms and for those firms that are R&D intensive. Cohen and Levinthal (1990) conceptualize absorptive capacity associated with external knowledge as having three components – ability to understand the knowledge, ability to assimilate it, and ability to apply it. In their study of Hungarian international joint ventures, Lane, Salk and Lyles (2001) find support for the understanding and application roles of knowledge gained from alliance partners but only partial support for the knowledge assimilation role. However, assimilation of the knowledge involves the use of internal routines to diffuse the knowledge within the organization, after the knowledge has been collected and understood. It is inherently more difficult and complex. Lane and Lubatkin (1998) have looked at absorptive capacity not in absolute terms, but as a dyadic construct defined as the relative absorptive capacity that exists between two firms. The authors find that even though relevance of basic knowledge, compensation practices, and shared research communities seem to be important as far as impact of absorptive capacity on firm learning is concerned, there is only partial support for availability of knowledge processing systems and no support for specialized knowledge available with the firms. Thus, even though the relative nature of the absorptive capacity is a better measure to use as compared to its absolute value, there still are uncertainties associated with which aspects of absorptive capacity make the highest impact on absorption and assimilation of partner knowledge.

In addition, what seem to matter are the transparency and receptiveness demonstrated by the firm in sharing knowledge (Larsson, Bengtsson, Henriksson and Sparks, 1998). Thus, a firm can adopt a collective knowledge strategy that varies from collaboration, competition, compromise, accommodation and avoidance. According to Larsson *et al* (1998), "Considering both partners' transparency as well as receptivity should be a substantial step forward in understanding and managing the learning alliance, but given the processual nature of learning interactions, we also need to include the dynamic interplay over time," (p.301).

However, though there is no doubt that relative absorptive capacity of a firm affects its learning outcome in inter-organizational relationships, in view of the mixed results it is intriguing to speculate about the exact impact of relative absorptive capacity on interfirm learning. We suggest that being constructs of entirely different kinds it is incorrect to treat complementary knowledge and relative absorptive capacity at the same level, in terms of their influence on firm performance in inter-organizational relationships. If one is a stock variable that constitutes the differences associated with content of knowledge, the other happens to be a process variable that affects the knowledge flow from one firm to the other. Therefore, we suggest that while complementary knowledge of a firm engaged in an inter-organizational partnership affects its performance, the nature of this relationship between the two constructs is accentuated by the firm's relative absorptive capacity. When relative absorptive capacity of the firm is high, the strength of the relationship of its complementary knowledge on performance is higher than it is when relative absorptive capacity is low. At the same time, being a potential or latent effect, relative absorptive capacity of the firm does not directly affect its performance but does so only indirectly, by affecting the relationship between complementary knowledge and performance. Based on these arguments, we propose:

> *Proposition 2: All other things being equal, the relationship between complementary knowledge and performance will be stronger in firms that demonstrate higher relative absorptive capacity compared to firms that demonstrate lower relative absorptive capacity.*

DISCUSSION AND IMPLICATIONS

To summarize, we have suggested that while a firm develops inter-organizational relationships in order to achieve sustained competitive advantage, the benefit from such partnerships crucially hinges on the firm's stock of complementary knowledge and relative absorptive capacity to learn from and assimilate such knowledge. Thus, while complementary knowledge affects firm performance, this relationship is moderated by the firm's relative absorptive capacity. By reconciling the potential effects associated with both stocks (denoted by complementary assets) and flows (indicated by the relative absorptive capacity) of knowledge associated with inter-organizational relationships, our model seeks to explain why we notice differential performance outcomes between comparable firms engaged in similar inter-organizational partnerships in the same industry. We do so by providing several insights, which are highlighted below as major contribution of our paper.

Contribution

We have suggested that following the learning perspective, inter-organizational relationships can be usefully considered as a mechanism employed by firms to derive sustained competitive advantage based on transfer of knowledge as a prime resource. Our first contribution relates to an integration of twin perspectives – the knowledge-based view of the firm and organizational learning perspective – in understanding a phenomenon of interest, viz. inter-organizational relationships.

This paper applies the idea of complementary knowledge – a concept derived from the notion of complementary assets rooted in the resource-based/knowledge-based views of the firm – to the concept of relative absorptive capacity, which is an idea from organizational learning. By doing so, we have attempted to integrate these two perspectives. This allows us to offer a possible explanation of why firms engage in inter-organizational relationships and for those firms that do why is it that we notice differential impact of such strategic action on performance. We concur with previous research that in the context of inter-organizational relationships which by its very nature are of a dyadic orientation, it makes sense to look at the relative effects of factors rather than their absolute effects. We clarify that in such partnerships, it is not the absolute value of knowledge but rather its relative importance or complementarity associated with it that matters. In other words, when we look at the influence of resources and capabilities that each partner brings to the relationship, not only should we be concerned about the uniqueness of the resources and capabilities but also consider their complementary characteristics. However, we go one step beyond the findings established in previous literature when we suggest that within the wider basket of complementary resources, it is the level of complementary knowledge associated with the alliance partners that makes an impact on each other's performance in inter-organizational relationships. In effect, our arguments not only reinforce the notion of knowledge-based view of the firm but also explain its usefulness in domains outside of the firm (such as inter-organizational relationships).

Again, while considering the impact of absorptive capacity of the firm on knowledge flows in inter-organizational relationships, we suggest that we need to focus on a firm's relative absorptive capacity in such knowledge transfer. This is because it is relative absorptive capacity that endows a firm with a unique capability to assimilate learning from its external partner. By suggesting the use of the construct relative absorptive capacity in our conceptual model, we incorporate the organizational learning approach in our understanding of the phenomenon. Not only is the firm's performance outcome in inter-organizational relationships affected by the complementary knowledge that it gets access to, but the overall ability to derive advantage out of such knowledge critically depends upon the learning ability of the firm.

Following from the above, the second contribution of this paper is in being able to integrate the notions of stock and flow of knowledge to suggest that a firm has to be strong on both, in order to derive performance benefits in inter-organizational relationships. In creating value in such partnerships, if complementary knowledge is the stock variable then the flow variable happens to be relative absorptive capacity. Only when both of them are available to a firm and at the minimum appropriate threshold levels, would competitive advantage arising out of inter-organizational relationships be sustainable. The scope for being able to use one in absence of the other is severely limited. By suggesting that assimilation of complementary knowledge and its impact on firm performance hinge on the firm's relative absorptive capacity, we lay the foundation of a process model of how firms derive competitive advantage based on learning partnerships in inter-organizational relationships. In effect, by considering relative values of knowledge content (complementary assets) as well as learning process (relative absorptive capacity), we suggest that building and sustaining competitive advantage based on inter-organizational relationship is a dynamic process that evolves with time.

Managerial Implications

The arguments laid out in this paper offer several practical insights for managers. First, we are suggesting that in order to achieve success in inter-organizational relationships, firms will have to focus on complementary knowledge as the key parameter and spend efforts in identifying the critical complementary knowledge that each partner can provide to the other. Formalizing an inter-organizational relationship with this focus at the outset will ensure that the firm's efforts are well-spent. At the same time, simply having an adequate stock of complementary knowledge is not enough. Each partner would need to also expand its relative absorptive capacity, which would help it to assimilate and utilize the knowledge. This would call for efforts in creating mechanisms within the firm that focus on the identification of strengths and redundancies associated with knowledge identification, transfer, assimilation and use within the firm and improving them, dovetailing them with similar efforts being initiated in the partner firm. In other words, our research adds insights for managers on how to make an inter-organizational relationship work based on knowledge assets, thus suggesting unique strategic, structural and process prerogatives that need to be incorporated in inter-organizational relationships.

REFERENCES

Appleyard, M.M. (1996). How does knowledge flow? Interfirm patterns in the semiconductor industry. *Strategic Management Journal*, 17, (Winter Special Issue), 137-154.

Auster, E.R. (1994). Macro and strategic perspectives on inter-organizational linkages: A comparative analysis and review with suggestions for reorientation. *Advances in Strategic Management*, 10B, 3-40.

Barney, J.B. (1986). Types of competition and the theory of strategy: Toward an integrative framework. *Academy of Management Review*, 11, (4), 791-800.

Barringer, B.R. and Harrison, J.S. (2000). Walking a tightrope: Creating value through inter-organizational relationships. *Journal of Management*, 26, (3), 367-403.

Buckley, P.J. and Carter, M.J. (1999). Managing cross-border complementary knowledge. *International Studies of Management & Organization*, 29, (1), 80-104.

Christmann, P. (2000). Effects of "best practices" of environmental management on cost advantage: The role of complementary assets. *Academy of Management Journal*, 43, (4), 663-680.

Cohen, W.M. and Levinthal, D.A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35, 128-152.

Combs, J.G. and Ketchen, D.J, Jr. (1999). Explaining interfirm cooperation and performance: Toward a reconciliation of predictions from the resource-based view and organizational economics. *Strategic Management Journal*, 20, (9), 867-885.

D'Aveni, R. A. (1994). *Hypercompetition: Managing the dynamics of strategic maneuvering.* New York: The Free Press.

Decarolis, D.M. and Deeds, D.L. (1999). The impact of stocks and flows of organizational knowledge on firm performance: An empirical investigation of the biotechnology industry. *Strategic Management Journal*, 20, 953-968.

Doz, Y. (1996). The evolution of cooperation in strategic alliances: Initial conditions or learning processes? *Strategic Management Journal*, 17, 55-83.

Dussauge, P., Garrette, B. and Mitchell, W. (2000). Learning from competing partners: Outcomes and durations of scale and link alliances in Europe, North America and Asia. *Strategic Management Journal*, 21, 99-126.

Dyer, J.H. and Singh, H. (1998). The relational view: Cooperative strategy and sources of inter-organizational competitive advantage. *Academy of Management Review*, 23, (4), 660-679.

Garud, R. and Kumaraswamy, A. (1993). Changing competitive dynamics in network industries: An exploration of Sun Microsystems' open systems strategy. *Strategic Management Journal*, 14, 351-369.

Gnyawali, D.R. and Madhavan, R. (2001). Cooperative networks and competitive dynamics: A structural embeddedness perspective. *Academy of Management Review*, 26, (3), 431-445.

Grant, R.M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17, (Winter Special Issue), 109-122.

Harrison, J.S., Hitt, M.A., Hoskisson, R.E. and Ireland, R.D. (2001). Resource complementarity in business combinations: Extending the logic to organizational analysis. *Journal of Management*, 27, 679-690.

Kraatz, M.S. (1998). Learning by association? Inter-organizational networks and adaptation to environmental change. *Academy of Management Journal*, 41, (6), 621-643.

Kogut, B. (2000). The network as knowledge: Generative rules and the emergence of structure. *Strategic Management Journal*, 21, 405-425.

Kogut, B. and Zander, U. (1993). Knowledge of the firm and the evolutionary theory of the multinational corporation. *Journal of International Business Studies*, Fourth Quarter, 625-645.

Lane, P.J., Salk, J.E. and Lyles, M.A. (2001). Absorptive capacity, learning, and performance in international joint ventures. *Strategic Management Journal*, 22, 1139-1161.

Lane, P.J. and Lubatkin, M. (1998). Relative absorptive capacity and inter-organizational learning. *Strategic Management Journal*, 19, 461-477.

Larsson, R., Bengtsson, L., Henriksson, K. and Sparks, J. (1998). The inter-organizational learning dilemma: Collective knowledge development in strategic alliances. *Organization Science*, 9 (3), 285-305.

McEvily, B. and Zaheer, A. (1999). Bridging ties: a source of firm heterogeneity in competitive capabilities. *Strategic Management Journal*, 20, 1133-1156.

Mody, A. (1993). Learning through alliances. *Journal of Economic Behavior and Organization*, 20, 151-170.

Mowery, D.C., Oxley, J.E. and Silverman, B.S. (1996). Strategic alliances and interfirm knowledge transfer. *Strategic Management Journal*, 17, 77-91.

Nielsen, B.B. (2005). The role of knowledge embeddedness in the creation of synergies in strategic alliances. *Journal of Business Research*, 58, 1194-1204.

Park, S.H. 1996. Managing an inter-organizational network: A framework of the institutional mechanism for network control. *Organization Studies*, 17, (5), 795-824.

Powell, W.W., Koput, K.W. and Smith-Doerr, L. (1996). Inter-organizational collaboration and the locus of innovation: Networks of learning in biotechnology. *Administrative Science Quarterly*, 41, 116-145.

Rothaermel, F.T. (2001). Incumbent's advantage through exploiting complementary assets via interfirm cooperation. *Strategic Management Journal*, 22, 687-699.

Saviotti, P.P. (1998). On the dynamics of appropriability, of tacit and of codified knowledge. *Research Policy*, 26, 843-856.

Shan, W. (1990). An empirical analysis of organizational strategies by entrepreneurial high-technology firms. *Strategic Management Journal*, 11, 129-139.

Shenkar, O. and Li, J. (1999). Knowledge search in international cooperative ventures. *Organization Science*, 10, (2), 134-143.

Singh, K. and Mitchell, W. (1996). Precarious collaboration: Business survival after partners shut down or form new partnerships. *Strategic Management Journal*, 17, 99-115.

Smith, K.G., Carroll, S.J. and Ashford, S.J. (1995). Intra- and inter-organizational cooperation: Toward a research agenda. *Academy of Management Journal*, 38 (1), 7-23.

Spencer, J.W. (2003). Firms' knowledge-sharing strategies in the global innovation system: Empirical evidence from the flat panel display industry. *Strategic Management Journal*, 24, 217-233.

Spender, J.C. (1996). Making knowledge the basis of a dynamic theory of the firm. *Strategic Management Journal*, 17, (Winter Special Issue), 45-62.

Stuart, T.E. (2000). Inter-organizational alliances and the performance of firms: A study of growth and innovation rates in a high technology industry. *Strategic Management Journal*, 21, 791-811.

Teece, D.J. (1988). Capturing value from technological innovation: Integration, strategic partnering, and licensing decisions. *Interfaces*, 18, 46-61.

Teece, D.J. (1986). Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. *Research Policy*, 15, 285-305.

Thorelli, H.B. (1996). Networks: Between markets and hierarchies. *Strategic Management Journal*, 7, (1), 35-51.

Young, G., Smith, K.G. and Grimm, C.M. (1996). 'Austrian' and industrial organization perspectives on firm-level competitive activity and performance. *Organization Science*, 7, (3), 243-254.