THE INFLUENCE OF INTERORGANIZATIONAL EMBEDDEDNESS ON MULTIPARTNER ALLIANCE STABILITY

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INTRODUCTION

Interorganizational collaboration plays a critical role in achieving a variety of political, social, technological and economic objectives (Gray, 1989). Many of the most challenging and valuable initiatives require the voluntary involvement and coordination of multiple organizations. One particular type of multiparty interorganizational collaboration which has become increasingly popular and economically important is the multipartner strategic alliance. A multipartner alliance is a collective, voluntary organization that interactively engages multiple legally-independent firms in such activities as R&D, manufacturing, and marketing (Lavie *et al.*, 2007). A multipartner alliance is characterized by a single overarching contractual agreement, shared management, and the pursuit of a common objective requiring each partner to interact and have a relationship with every other partner within the alliance.

Relative to two-party alliances, multipartner alliances have the potential to disproportionately impact the competitive environment due to the breadth of participants and scope of their aspirations. Despite their prevalence and importance, multipartner alliances have been largely ignored by previous studies on interfirm collaboration. Moreover, multipartner alliances are inherently more complex than two-partner alliances because the number of dyadic interactions and interdependencies within a multipartner alliance increase exponentially with the number of partners (Dialdin, 2003; Simon, 1962). Such increasing complexity generates greater coordination costs (Garcia-Canal, 1996), increases exchange hazards (Oxley, 1997), and magnifies the problem of selectively punishing partner opportunism (Zeng *et al.*, 2003). Because of this complexity, the stability of multipartner alliances can be particularly tenuous (Park *et al.*, 1996). Because multipartner alliances are distinctly different from two-party alliances, existing research on two-party alliance stability provides an incomplete understanding of multipartner alliance stability.

We explore multipartner alliance stability by extending the logic of embeddedness for interorganizational relations. Alliance partners are embedded when their network of prior or existing alliances serves as a source of trustworthy information about the capabilities and reliability of the partner firm (Gulati *et al.*, 1999). One property that distinguishes multipartner alliances from two-party alliances is the fact that the multiple dyadic relationships within a multipartner alliance give rise to a distribution of embeddedness, e.g., a given firm may be highly embedded with some partners within the multipartner alliance but less so with others. Thus, multipartner alliances differ not only in terms of average embeddedness across multiple

dyadic relationships within the alliance, but also in how embeddedness varies across these dyadic relations.

HYPOTHESES

We consider an alliance to be unstable when it experiences substantial changes (e.g., contractual renegotiation, equity participation) or unexpectedly dissolves (Das *et al.*, 2000; Inkpen *et al.*, 1997). To understand the conditions that influence multipartner alliance stability, we draw from the social embeddedness literature (Granovetter, 1985; 1992). The social embeddedness framework is based on the premise that people prefer to do business with trustworthy partners. Interorganizational embeddedness develops as firms rely on social relations to obtain information regarding each other's competencies, needs, and reliability from previous direct alliances and from their indirect alliance ties through common third parties (Gulati *et al.*, 1999).

Relational embeddedness depends on the history of direct interaction between two actors and reflects the strength of their relationship (Granovetter, 1992). In the context of interfirm alliances, relational embeddedness refers to the duration, frequency, and level of resource commitment between two partners (Gulati, 1995a; Rowley *et al.*, 2000). Prior relationships between two partners increase the strength of their current relationship and the level of relational embeddedness between them (Gulati *et al.*, 1999). Relational embeddedness creates informal and efficient means of alliance governance that reduce opportunism and coordination costs by creating trusting relationships (Granovetter, 1985; Gulati, 1995b; Ring *et al.*, 1992), norms of reciprocity (Larson, 1992), and social identification with the alliance (Jones *et al.*, 1997; Nahapiet *et al.*, 1998). All else being equal, the social cohesiveness of the partners in a multiparty alliance will increase with their average relational embeddedness, increasing the alliance's stability.

Hypothesis 1a. The higher the average relational embeddedness among all firm-pairs involved in a multipartner alliance, the more stable the alliance will be.

Structural embeddedness refers to the extent to which actors in a dyad have relationships with the same third parties (Nahapiet *et al.*, 1998). Structural embeddedness provides effective informal alliance governance that reduces opportunism by generating trust and reciprocity between partners. Third party ties promote trust by increasing the cost of opportunism (Coleman, 1988). A firm's opportunistic tendencies are more transparent to its partners when it is embedded in a dense network of third party ties which can broadly communicate instances of bad behavior (Gulati, 1998). Because the costs of opportunism can outweigh the benefits, firms will refrain from such behavior if it is likely to become widely known. Thus, structural embeddedness generates "enforceable" or "deterrence-based" trust (Kreps, 1990; Raubb *et al.*, 1990). Structural embeddedness reduces the costs of coordination between partners by improving conflict management. Common third parties can be used to mediate the concerns of conflicting partners in an objective and impartial manner (Krackhardt, 1998; Simmel, 1950). Multipartner alliances benefit from higher average structural embeddedness across the various firm-pairs in the alliance, because stable dyadic relationships are essential to the stability of the larger alliance.

Hypothesis 1b. The higher the average structural embeddedness among all firm-pairs of a multipartner alliance, the more stable that alliance will be.

Considering the embeddedness of a dyad of partner firms can yield valuable insights into simple two-party alliance governance, which suggests that highly embedded relationships generally lead to greater stability (Larson, 1992; Uzzi, 1997). However, a simple application of such logic to multipartner alliances may be problematic. For a multiparty alliance, the level of embeddedness of a partner dyad relative to the other partner dyads may be of consequence. An imbalance in relational and structural embeddedness within a multipartner alliance can hamper its stability. Firms decide to maintain commitments in an alliance based on whether they perceive processes and outcomes to be equitable (Doz, 1996; Ring *et al.*, 1992). If collaborative activities are not perceived to be equitable, the partners will either renegotiate or reduce their commitments to the alliance (Arino *et al.*, 1998).

The development of coalitions within a group can diminish an overall sense of fairness and equity. When some members of a group are highly cohesive and others are not, in-group and out-group sentiments and factionalism can occur within the larger group (Pearce, 1997). A pronounced imbalance in relational embeddedness among alliance partners can lead to problematic coalition formation and fault lines. Prior relationships among a subset may become the basis for a coalition, as fault lines form between those who have shared previous experiences and those who have not (Lau *et al.*, 1998). Those firms that share previous alliance experience may view themselves in terms of their previous relationships as opposed to being members of the present alliance. In so doing, cohesiveness with those outside the coalition may be constrained, leading to mistrust between those in and out of the coalition. An extensive network external to the alliance shared by a subset of the partners can also provide the basis for a coalition. A shared network of external partners is indicative of shared values and aspirations that can bind partners together, at the expense of overall alliance cohesiveness. Partners can use a common network to gain information about each other in order to build tighter bonds, compared to those who do not share such an external network. In sum, an imbalance of either relational or structural embeddedness within a multipartner alliance can lead to factionalism and coalition building. Such coalitions create the potential for adverse influence and opportunistic behavior that can hamper the stability of the larger multipartner alliance.

Hypothesis 2a. The greater the imbalance in relational embeddedness across all firm-pairs in a multipartner alliance, the less stable the alliance will be.

Hypothesis 2b. The greater the imbalance in structural embeddedness across all firm-pairs in a multipartner alliance, the less stable the alliance will be.

An imbalance in relational and structural embeddedness within a multipartner alliance may also minimize benefits that are normally obtained from a higher average level of relational embeddedness. Higher levels of relational embeddedness in a two-party alliance lead to greater stability thanks to joint problem-solving capacities (Pisano, 1989), the development of shared routines (Uzzi, 1997), and sharing confidential information that is proprietary and tacit (Larson, 1992; Uzzi, 1996). Within a multiparty alliance, such benefits will likely be limited by the most weakly embedded partners. The development of joint problem-solving skills within a multipartner alliance also depends on whether relational embeddedness is evenly distributed across the range of partners. Problem-solving skills develop between firms over the course of repeated interactions (Uzzi, 1997). Partners in a multipartner alliance must typically interact simultaneously to address problems. When only a subset of firms develop joint problem-solving

skills as a result of relational embeddedness, the benefits of such skills will be limited to those firms and not contribute to the overall stability of the alliance. The stability of a multipartner alliance may be hampered when routines are shared by only a few highly embedded partners. Where relational embeddedness across partner dyads within a multipartner alliance varies widely, some partners will develop shared routines that differ or conflict with those of other firms. The stabilizing benefits of shared routines that result from relational embeddedness will more likely be realized when relational embeddedness imbalance is low.

Hypothesis 3a. The greater the imbalance in relational embeddedness across all firm-pairs in a multipartner alliance, the weaker the relationship between average relational embeddedness and the stability of the multiparty alliance.

An increase in the structural embeddedness of a two-party alliance can improve its stability because third party ties increase trust, reciprocity (Gulati *et al.*, 1998) and the resolution of disputes (Krackhardt, 1998; Simmel, 1950). But within a multiparty alliance, these benefits may be muted if structural embeddedness is distributed unequally across the various partner dyads. Partners who share common third parties may damage their reputations if they behave opportunistically since the flow of information will be carried outside the alliance via third party partners. However, if the structural embeddedness is imbalanced across the partner dyads of a multipartner alliance, the overall closure of the network surrounding the alliance will be asymmetric. Information flow beyond the alliance via third-party partners, and the potential costs of damaged reputations, will be limited to the subset of partners that share third-party ties. Weakly embedded partners may have heightened incentives to behave opportunistically, since such behavior has a lower probability of detection relative to more embedded firms. The stability of the alliance can be jeopardized despite generally strong, if unevenly distributed, structural embeddedness.

Hypothesis 3b. The greater the imbalance in structural embeddedness across all firm-pairs in a multipartner alliance, the weaker the relationship between average structural embeddedness and the stability of the multiparty alliance.

METHODS

We tested our hypotheses using a sample of multipartner alliances in the global telecommunications equipment industry during 1987–1997. We recorded collaborations using multiple sources for104 leading firms in the industry. During the study period these firms formed a total of 7,978 alliances, 1089 (13.65 %) of which involved more than two partners. However, in order to compute our structural embeddedness measures, we needed to identify all firms that served as common third-parties to any two firms in our sample alliances during the period of study. This implied that we could only consider alliances which were composed exclusively of panel firms so that the complete collaborative history was available for all partners. This was a formidable challenge, and greatly reduced the potential sample of multipartner alliances. Only 60 multipartner alliances that operated during 1987–1997 matched this stringent criterion leading to an effective sample size of 261 alliance-years.

Our dependent variable, alliance stability refers to the absence of major changes in an alliance or dissolution of the alliance which is unplanned from the perspective of one or more partners (Das *et al.*, 2000; Inkpen *et al.*, 1997). We measured multipartner alliance stability using

a time-varying dummy variable, set to 0 for every time period *t* in which alliance *k* existed at the end of the year, and 1 otherwise. We qualified termination events as planned and unplanned where archival information was available.

To capture the average relational embeddedness within a multipartner alliance, we measured the average number of repeated alliances formed by all possible pairs of partners in the alliance. Following prior alliance research, we used a five-year moving window to identify prior ties (Gulati *et al.*, 1999). To measure the balance/imbalance in the distribution of relational embeddedness in multipartner alliance *k* in year *t*, we computed the sample variance of the distribution of its dyadic relational embeddedness values. We computed the average structural embeddedness of multipartner alliance *k* in year *t* as the total number of such common third-party partners for all dyads in the alliance, divided by the number of possible dyads. To measure the balance/imbalance in the distribution of the structural embeddedness of firm-pairs in multipartner alliance *k* in year *t*, we computed the sample variance of the distribution of its dyadic structural embeddedness values. A high variance in indirect ties among multipartner alliance participants involving non-alliance firms suggests that some firm-pairs had many common external third parties while others had few or none. To minimize alternative explanations, and isolate the marginal effects of the explanatory variables, we controlled for joint venture governance, alliance scope, cultural diversity, market overlap, number of partners, and alliance industry classification whose influence on stability might be confounded with the explanatory variables.

We estimated Cox proportional hazards models, an estimation approach that has been widely used in alliance stability research (Dhanaraj *et al.*, 2004; Hennart *et al.*, 1998; Kogut, 1989; Park *et al.*, 1996). To account for potential autocorrelation caused by unobserved alliance effects that are stable over time, we clustered observations by sample alliance and reported clustered standard errors that were robust to both arbitrary heteroskedasticity and arbitrary intra-group correlation (Rogers, 1993). To control for unobserved systematic period effects, such as differences in industry conditions that can influence alliance stability, we included year dummies in all estimations. We lagged all independent variables by one year, which facilitated causal inferences by establishing temporal precedence, reducing concerns of reverse causality, and avoiding simultaneity.

RESULTS

Our preliminary analysis shows that average relational and average structural embeddedness are highly correlated (0.87). High collinearity may be a function of the firms in the sample and their propensity to collaborate in general. However, in the agreement with our theoretical arguments, we expected distinct mechanisms associated with relational and structural embeddedness, and thus decided to test their effects in separate models.

The results showed that both average relational and structural embeddedness were negative and significant. A negative coefficient indicates a reduced probability of multipartner alliance failure, thus we find support for the general stabilizing effect of average embeddedness (H1a & H1b). We also find general support for the destabilizing effect of embeddedness imbalance (H2a & H2b). We find no significant effect for the interaction of average relational embeddedness and relational embeddedness imbalance (H3a). In contrast, the interaction of average structural embeddedness and structural embeddedness imbalance was negative and significant providing support for H3b.

DISCUSSION

This study was motivated by empirical and theoretical limitations of research on interorganizational collaboration. This literature has largely ignored multiparty alliances, which is surprising given their prevalence and competitive importance. The assumption that the same theoretical logic used to study two-party alliances and the associated empirical results will be applicable to multipartner alliances may be suspect. We suggested that applying the embeddedness concepts in studies of two-party collaboration to multiparty alliances fails to provide a complete view of the multiple dyadic relationships within these complex alliances. Multipartner alliances are more complex than dyadic alliances, and the relational and structural embeddedness of the dyads of firms that constitute them can vary widely. We argued that the alliance-specific mean and variance of this distribution will independently and interactively influence the stability of a multipartner alliance.

The results were mostly consistent with the predictions of our theoretical framework. We found that higher average levels of relational and structural embeddedness in a multipartner alliance reduced the likelihood of unplanned termination. This may suggest that higher overall levels of interorganizational embeddedness lead to more trusting relationships, shared routines, joint problem-solving, and improved conflict management within a multipartner alliance, which promote its stability. These results complement research on two-party alliances, which shows that higher levels of interorganizational embeddedness are associated with reduced opportunism and coordination costs (Gulati et al., 1998). We also found that an imbalance in interorganizational embeddedness across dyads of partners within a multipartner alliance hampers its stability. Failing to account for the distribution of embeddedness across multiple dyadic relationships within a multiparty alliance can result in an incomplete understanding of inter-firm collaboration.

The results of this study have implications for the literatures of interorganizational collaboration and embeddedness. First, we contribute to the extensive literature on interorganizational collaboration by exploring the relationship between interorganizational embeddedness and multipartner alliance stability. This study is the first of any we know that examines the causes of multipartner alliance stability. Our findings demonstrate that the distinction between average and variance of interorganizational embeddedness for dyads in a multipartner alliance is critical to understanding a key metric of alliance performance. Second, the results of this study contribute to debate and discussion regarding the contingent value of social network structure (e.g., Adler & Kwon, 2002). In this discussion, network structures are distinguished based on the extent to which triads of actors are open or closed (Burt, 1992; Coleman, 1988). We found that the stability of a multipartner alliance improved when more dyads of partners involved in the alliance belonged to closed triads with firms from outside the alliance. This may suggest that mean-level network closure around a multipartner alliance provides instrumental benefits for members of the alliance, by increasing the stability of the alliance. We also found, however, that the variability of triadic closure surrounding a multipartner alliance reduced its stability and weakened the stabilizing benefit of mean-level triadic closure. In the context of multipartner alliances, increasing average network closure provides social capital, while an increased variability in network closure can pose a social liability for alliance members. To our knowledge, these competing effects of network closure have not been identified in prior research.

REFERENCES AVAILABLE FROM THE AUTHORS