Orchestrating Alliance Networks: the Role of Innovation Appropriability, Knowledge Sharing and Network Capability

Abstract

Alliance networks can often be viewed as loosely coupled systems of autonomous firms. We propose that firms orchestrate network activities to ensure the creation and extraction of value. Orchestration comprises network capability, knowledge sharing, and innovation appropriability. Firstly, we apply the network theory to investigate whether the development of network capability and knowledge sharing enhance the performance of alliance networks. Secondly, this research addresses a dimension that describes the interdependence of network members, namely, innovation appropriability. This study provides a more integrated understanding of managing innovation appropriability by examining how relational processes (interparty trust) and the design and application of structural elements (joint governance and procedural justice) affect knowledge sharing and the firm’s network capabilities. The focal concept framework is developed from network theory, the knowledge-based view and alliance governance literature.

Key Words: Network Capability; Knowledge Sharing; Innovation Appropriability; Alliance Performance
INTRODUCTION

Relations defined by linkages among units are a fundamental component of network theories (Wasserman & Faust, 1994). According to the definition of Wasserman and Faust (1994: 20), “A social network consists of a finite sets or sets of actors and the relation or relations defined on them”. According to Soh et al. (2004), interfirm networks enrich firms’ information and knowledge in two ways: first, networks act as “pipes” to flow information between two parties (Cross & Cummings, 2004; Gulati, 1999); second, networks function as “prisms” that reflect the resource quality and endowments of particular firms (Park, Chen, & Gallagher, 2002; Sampson, 2007).

Knowledge has the property of being a public good and it might be transferred at zero marginal cost (Kogut & Zander, 1993). This public good character of knowledge results in the critical properties of being easily transferred but at the same time being hard to be protected. Because knowledge sharing in alliance networks is usually complicated by problems of free riding and opportunism, appropriability becomes a central concern in the economic of innovation (Dhanaraj & Parkhe, 2006). The firm in alliance networks need to ensure that value created is distributed equitably and is perceived as such by network members. Therefore, the first task of orchestrating alliance network is to manage innovation appropriability.

In the global competing environment, companies have witnessed a marked shift toward external alliances for new product and service development. Such innovation typically involves high levels of
transactional uncertainty and knowledge exchange problems that demand strategic action to form and
maintain an alliance network and to extract value from it (Ahuja, 2000; Gomes-Casseres, 1994). Not
surprisingly, the growing interest in how organizations learn from their partners and develop new
capabilities through alliances has led to the emergence of a distinct stream of research. From
innovation perspective, knowledge provides the organization with the potential for novel action, and
this process often entails finding new uses or new combinations of previously disparate ideas (Phene
& Almeida, 2008). In the particular context of innovation networks, where knowledge is the chief
currency to be dispersed, the second task of orchestrating alliance network is to ensure knowledge
sharing among network members.

Different companies within any given network might have different strategic targets, interests,
and even have to compete with their partners in the same industrial network. This kind of competitive
pressures among network members can exacerbate the instability, and consequently actors may stop
collaborating with their partners (Gomes-Casseres, 1994). Therefore, the third task of orchestrating
alliance network is to develop the firm’s capabilities to manage complicated interorganizational
relationship. Although some scholars identify the difficulty of managing alliances and the need to
develop the ability to manage interorganizational relationship (Anand & Khanna, 2000), there is no
further development of the concept of such capabilities. According to Ritter and Germunden (2004), a
firm’s “network capability” is defined as the ability to initiate, handle, use, and terminate network
relationships. In this study, we plan to investigate the factors influencing a firm’s network capability
and whether the development of such capability can enhance alliance performance.

THEORETICAL DEVELOPMENT

Innovation Appropriability

Appropriability refers to “govern an innovator’s ability to capture the profits generated by an innovation” (Teece, 1986: 610). Firms involving in various kinds of external collaboration relationships are able to introduce the higher level of innovation (Tether, 2002). However, Dhanaraj & Parkhe (2006) point out that knowledge distribution is often complicated by problems of free riding and opportunism. Free rider behaviors occurs when an actor does not contribute to an alliance but enjoy the benefits of the network, and simply behaves opportunistically to take away the potential commercialization of new ideas unfairly, or takes advantage of the openness of other actors in the alliance (Dhanarag & Parkhe, 2006; Gulati, 1995). This kind of “collective action” or “free rider” problem may restrain the ability to effectively manage network-level knowledge-sharing processes related to innovation advantages enjoyed by alliance members (Dyer & Nobeoka, 2000). Appropriability becomes a central concern of innovation in the network (Teece, 2000; Teece, 1986).

In alliances literature, two perspectives provide different views related to ensure equitable distribution of value and mitigate appropriability: structural perspective and relational perspective (Madhok, 1995). Studies building on structural perspective identify complex contracts with a large number of clauses specified in detail, as safeguarding devices that mitigate the perceived risk of
opportunistic behavior (Deeds & Hill, 1999; Poppo & Zenger, 2002). They also argue that contracts are coordination mechanisms that, through specifying a precise routines and procedures for the integration of dispersed activities, simplify decision making and prevent disputes on how to achieve tasks (Pisano, 1990; Reuer & Arino, 2007).

However, Gimeno (2004: 822) point out that “in contrast to market contracts, alliances involve incomplete contracts that do not fully specify the conditions of exchange”. This means that alliances allow more flexible and adaptive interfirm exchanges. Alliance success depends on effective governance of an ongoing relationship among parties with divergent interests (Gimeno, 2004). The relational perspective promotes this view of more relational governance strategy in which partners rely on mutual trust to address issues of safeguarding and coordination (Faems, Janssens, Madhok, & Van Looy, 2008). Dyer & Singh (1998) distinguish two classes of governance used by alliance partners: "formal" safeguards (e.g. financial and investment hostages) and "informal" safeguards (such as trust). According to their views, informal safeguard mechanisms are generally more effective than formal safeguard mechanisms. Although structural and relational alliance governance perspectives tend to focus exclusively on how to manage alliance innovation appropriability, scholars has indicated that these two aspects are related to each other in governing alliances (Bell, den Ouden, & Ziggers, 2006; Doz, 1996). Based on Dhanaraj & Parkhe (2006) and Luo (2008), we propose three processes to ensure equitable distribution of value and reduce the concerns of appropriability: interparty trust, procedural justice, and joint governance. These processes enable stronger coupling and integration in
alliances which members are encouraged to interdependently share existing resources, develop new resources, and reciprocally commit to joint operations. We now illustrate below the rationales for each of these relationships

**Interparty trust**

Doz (1996) suggests that trust is a critical factor affecting interfirm knowledge transfer and creation. Mutual trust reduces the fear of opportunism by alliance partners and the firms will be more willing to move forward even though uncertainty in the relationship may remain (Nootenboom, Berger, & Noorderhaven, 1997). When trust is high, firms may be more likely to invest resources in learning because of the willingness of their partners to refrain from specific controls over knowledge spillovers. In turn, trust encourages partners to minimize redundancies in the search process by exploiting each other’s expertise to engage in specialized search (Krishnan, Martin, & Noorderhaven, 2006).

Uzzi and Gillespie (2002) argue that commercial transactions embedded in social ties instill into future exchanges expectations of trust and reciprocity. When the relationships between industrial network members are embedded with trust, firms may be more willing to share valuable knowledge (Dyer & Singh, 1998). Consequently, in the atmosphere of trust, appropriability concerns are low, and knowledge flow flourishes because firms are more willing to share their proprietary knowledge. Therefore:

**Hypothesis 1a:** Interparty trust will positively influence knowledge sharing in the alliance network.
Trust has been widely acknowledged as a key social norm in governing and coordinating alliances (Anand & Khanna, 2000; Shah & Swaminathan, 2008). If the necessary level of trust has not been created in alliances, lack of cooperation, unwillingness to share information, and sabotage of future decision processes may result (Korsgaard, Schweiger, & Sapienza, 1995). Mutual trust among partners contributes to the development of open cooperative culture in alliances. Openness of cooperative culture increases network capabilities by giving alliance members the necessary flexibility, spontaneity, and responsibility to develop interorganizational relationships (Ritter & Gemunden, 2003).

Trust is viewed as an important element of long-term relationships and is important for relational governance (Dwyer, Schurr, & Oh, 1987; Mahoney, 1992). Defined in contracting behavior terms, trust reflects “the extent to which negotiations are fair and commitments are upheld” (Anderson & Narus, 1990). It enhances perceptions that the partner will be willing and able to fulfill role obligations and try to maximize joint gains in the relationship (Lorenzoni & Lipparini, 1999). Therefore, trust enables firms to execute the network management tasks intensively in a goal-oriented manner. Hence:

**Hypothesis 1b:** Interparty trust will positively influence a firm’s network capabilities.

*Joint governance*

Joint governance is a cornerstone of an alliance’s economic structure that guides interparty exchanges (Folta, 1998). It means “purposefully and collectively designed to guide, monitor, and
oversee collaboration operations in pursuit of a maximum joint payoff” (Luo, 2008: 623). The firm concerns about its ability to capture a fair share of the rents from the alliance in which it is engaged. Such concerns arise from the uncertainties associated with future expectations, cost uncertainties, and problems in observing partners’ contributions, all of which aggravate the potential for moral hazards (Folta, 1998).

Joint governance manifests itself through two primary templates: “(1) jointly stipulated contractual codifications and (2) jointly formalized and routinized control principles, procedures, rules, norms, practices, and policies” (Luo, 2008: 623). Well-established joint governance system narrows the risk of bilateral exchange; accordingly, it also encourages subsequent cooperation and integration between two parties (Poppo & Zenger, 2002). Furthermore, joint governance makes one party’s behavior more predictable to the other, thus enhancing the levels of mutual commitments and reciprocal sharing. Governance-associated coordination costs for boundary-spanning activities can be reduced (Luo, 2008).

Through jointly formalized and routinized control principles, joint governance system forms a formal institutional framework that guides interparty exchanges (Luo, 2008). It makes alliance partners work together and learn about each other’s actions (Poppo & Zenger, 2002). In addition, joint governances increase opportunities for mutual learning about respective managerial practices and administrative polices that can be implemented in better joint operations. This provides clear and transparent incentives for knowledge sharing. We thus posit:
Hypothesis 2a: Joint governance will positively influence knowledge sharing in the alliance network.

In order to learn from the partners smoothly in alliances, existing organizational incompatibilities must be compensated. Otherwise, the inherent procedural, structural, and cultural differences between organizations become insurmountable obstacles to a successful cooperation. Joint governance is purposefully and collectively designed to guide, monitor, and oversee an alliance’s operations in pursuit of a maximum joint payoff. Gulati and Singh (1998) suggest that alliances with more joint government controls are capable of providing greater coordination and information processing capabilities than those with fewer controls.

First, joint governance offers relationship-specific assets to alliance members. Joint governance arrangements greatly enhance the exchange relationships because alliance partners work through the difficulty and receive direct feedback about activities and operations (McEvily & Marcus, 2005). This kind of interactive relationship is particularly important for the transfer and development of capabilities. Acquiring a capability from the partners usually requires multiple interactions. Joint governance provides an ongoing and formal interaction platform for firms to learn to work together and to build multiple relationships.

Second, joint governance makes it easier to coordinate tasks between partners by clarifying decision-making procedures and anticipating issues before they arise. If partners lack the understanding of each other’s operating requirements or if they are unwilling to make concessions and
meet on a middle ground for cooperation, misunderstandings will result and a lack of support for the relationship will give rise to frustration and disillusionment with the partnership (Niederkofler, 1991). Joint governance typically involves routines of resolving problems and difficulties for the mutual adaptations. A high integration of formal communication structure helps to develop interorganizational relationships and enhance network capabilities (Ritter & Gemunden, 2003). We, therefore, hypothesize:

**Hypothesis 2b**: Joint governance will positively influence a firm’s network capabilities.

_Procedural justice._

Procedural justice concerns the extent to which the alliance’s decision process and procedures that impact each party’s gains and interests are judged to be fair, transparent, unbiased, and accordant with contractual specifications (Kim & Mauborgne, 1998; Luo, 2008). Luo (2005: 696) indicates that the major areas requiring fairness include procedures used in “(1) building and structuring the alliance (i.e., board formation and decision making, contract codification, and joint venture establishment), (2) organizing and managing the alliance (i.e., strategic planning, autonomy allocation, and routine management), (3) governing resource sharing (i.e., knowledge transfer, innovation, and resource contribution), and (4) executing alliance plans and decisions (i.e., clarity of execution procedures, contract-execution monitoring, and decision-execution monitoring)”.

Alliance value-creation often rests on the willingness of managers to actively share their insight, creative ideas, and expertise. Luo (2008) argues that when people feel their strategic decision-making
processes are fair, they display a high level of voluntary cooperation. The reason is that individuals care about the fairness of decision-making procedures because justice procedures assures people to protect their self-interests in the long run (Johnson, Korsgaard, & Sapienza, 2002). Procedural justice provides guidelines for structuring decision-making processes to maximize fairness perceptions. It enhances individual cognitive confidence in the decision-making process and builds feelings of belonging and loyalty (Johnson, Korsgaard, & Sapienza, 2002). Kim & Mauborgne’s (1998) study suggests that voluntary cooperation acts as a strong catalyst for the creation and sharing of knowledge and expertise. Furthermore, procedural justice is valuable because it allows individuals to voice their views in the decision process, promoting active information exchange (Luo, 2005). The willingness to express one’s ideas or bilateral communication, which is a key element of engagement, implies the opportunity to voice one’s perceptions, knowledge, and ideas, and the need to hear the other parties (Kim & Mauborgne, 2003). This increases the possibilities that knowledge will be diffused and shared.

In light of the above discussions, we propose the following hypothesis:

**Hypothesis 3a:** Procedural justice will positively influence knowledge sharing in the alliance network.

Procedural fairness becomes a backbone sustaining interparty cooperation because alliance payoff is very difficult to anticipate due to external and internal uncertainties (Luo, 2005). Procedural justice is powerful in improving acceptance of new internalized norms, and alleviating differences in managerial styles. The function of fair procedures is symbolic and helps to strengthen a firm’s
relationships with other organizations (Korsgaard, Schweiger, & Sapienza, 1995). Procedural fairness
nourishes an alliance partner’s commitment to joint efforts and strengthens its loyalty to the
organization (Johnson, Korsgaard, & Sapienza, 2002). Therefore, procedural justice often plays a
critical role in helping firms to manage the stability of networks.

Moreover, procedural justice contributes to the goal alignment among alliance members and
consolidates positive interparty interests. The basic premise of justice theories is that fair treatment is
central to people and a major determinant of their reactions to decisions (Korsgaard, Schweiger, &
Sapienza, 1995). Even when a particular decision is unfavorable to alliance members, if they could
voice, they will feel that their interests are protected in the long run and will consider the identification.
Fair treatment creates cooperative value by removing fears of exploitation and by demonstrating
respect for the rights and dignity of the other party (Luo, 2008). Hence, procedural justice will
enhance the firms’ abilities to manage the network. Therefore, we posit:

**Hypothesis 3b:** Procedural justice will positively influence a firm’s network capabilities.

Knowledge Sharing and Network Capabilities

According to the knowledge-based view of the firm, the development of organizational
capabilities to manage any particular task depends on a firm’s ability to share knowledge associated
with managing or executing that task (Grant, 1996). “Communities of personal interaction” are a
central element of knowledge sharing within alliances (Kale & Singh, 2007). They provide a means
for regular and systematic sharing alliance management knowledge that has already been articulated or
codified by the firm. This knowledge shared by outside firms can be an important stimulus for organizational improvement.

Firms may acquire alliance knowledge that supports the firm’s ability to manage the collaborative task (Inkpen & Tsang, 2005). Knowledge sharing among alliance partners provides a channel that helps managers better conceptualize the alliance knowledge that is being disseminated throughout the firm. It provides alliance managers an opportunity to test their hypotheses and assumptions regarding best practices to carry out alliance-related tasks at hand (Kale & Singh, 2007). Consequently, such knowledge sharing plays a critical role in accumulating network capabilities within firms. Therefore, we propose the following hypothesis:

**Hypothesis 4:** Knowledge sharing is positively related to a firm’s network capabilities.

**Knowledge Sharing and Alliance Performance**

Various scholars have argued that interorganizational learning is critical to competitive success, noting that firms often learn by collaborating with other firms (Hennch, 2005; Janowicz-Panjaitan & Noorderhaven, 2008). Strategic alliances are considered to be a particularly suitable network for partners to access and share each other’s knowledge-based resources (Hall, 1992; Powell, Koput, & Smith-Doerr, 1996). In the context of alliance learning process, knowledge sharing involves “exchanging and disseminating individually and organizationally held alliance management knowledge, which is both tacit and/or codified, through interpersonal interaction within the organization” (Kale & Singh, 2007: 985).
In a strategic alliance, knowledge sharing can be viewed from the following perspectives. Firstly, firms learn with an alliance partner when the partners jointly enter a new business area and develop new capabilities. Secondly, firms acquire knowledge from alliance partners by gaining access to the skills and competencies the partners bring to the alliance (Baum, Calabrese, & Silverman, 2000; Kogut, 1988). Knowledge sharing among alliance partners enables a firm to exploit useful knowledge to invest in alliance activities.

Recent research attempts to understand alliance activities from a knowledge-based perspective and posits that the sharing of knowledge become central to develop new processes, products, or services in alliance (Gulati & Singh, 1998; Hoang & Rothaermel, 2005). Some studies suggest that a firm's alliance partners are the most important source of new ideas and information that result in performance-enhancing technology and innovations (Dyer & Singh, 1998; Powell, Koput, & Smith-Doerr, 1996). Based on the above arguments, knowledge sharing process plays an important role in explaining a firm’s overall alliance success. Firms will enjoy greater alliance success by developing superior interfirm knowledge sharing routines. Therefore:

**Hypothesis 5:** Knowledge sharing is positively related to alliance performance.

**Network Capabilities and Alliance Performance**

The network approach differs from traditional views in several aspects. Firstly, traditional perspectives of the resource-based view and transaction costs theory regard strategic alliances as temporary matching games for firms to look for distinctive resources or minimizing cost. Rather, from
the network perspective, forming a strategic alliance represents a commitment to investing in certain relation-specific assets (Chen & Chen, 2002). Secondly, the focus of the organizational learning and dynamic capability literature is on the individual firm. Comparatively, the network theory suggests that a “network” of firms may be a critical unit of analysis for understanding firm level activities (Dyer & Nobeoka, 2000; Dyer & Singh, 1998). Because of alliance partners’ dependence on each other, various scholars have recognized that inter-organizational level activities are more critical for analyzing the function of strategic alliances (Gimeno, 2004; Hoffmann, 2007).

Relations defined by linkages among units are a fundamental component of network theories (Wasserman & Faust, 1994). According to the definition of Wasserman and Faust (1994: 20), “a social network consists of a finite sets or sets of actors and the relation or relations defined on them”. Organizations, including alliances, can be conceived of as a bounded social system in which there are interpersonal linkages through which messages flow and which affect the productivity and maintenance of the system (Schuler, 1975).

Interunit networks are an important part of organizational learning and resource sharing (Tsai, 2001). Firms located in networks get opportunities to exchange knowledge, learn from experiences, and benefit from the synergistic effect of pooled resources. According to Soh, Mahmood, and Mitchell (2004), interfirm networks enrich firms’ information and knowledge in two ways: first, networks act as “pipes” to flow information between two parties (Cross & Cummings, 2004; Gulati, 1999); second, networks function as “prisms” that reflect the resource quality and endowments of particular firms
In this study, we follow Walter et al. (2006: 546) and define network capabilities (NC) as the firm’s abilities to initiate, maintain, and utilize relationships with various external partners. The word “network” means that relationship management goes beyond single relationship. The term “capabilities” express that NC is understood as dynamic processes and an organization-wide characteristic (Walter, Auer, & Ritter, 2006). Strategic alliances are often characterized by inherent instability arising from uncertainty regarding a partner's future behavior and the absence of a higher authority to ensure compliance. Lorenzoni & Lipparini (1999) indicate that the greater the instability, the lower the network’s value creation. However, network capabilities can help to create a sustainable stable situation which alliance partners perceive fair value sharing and prosper in the long term. Network capabilities enable a company to establish and manage relationships with other organizations. According to the Ritter’s (1999) study, a firm’s network capabilities have a positive impact on the degree of firm’s interactions with other organizations. As firms interact more broadly and deeply with each other, they can understand each other’s capabilities and idiosyncrasies. This leads to better network stability, hence contributes to alliance performance (Dhanarag & Parkhe, 2006). Therefore, we suggest the following hypothesis:

**Hypothesis 6:** A firm’s network capabilities are positively related to alliance performance.
METHOD

Data Collection and Sample

We employed questionnaire survey to collect data. Variables in the questionnaire include background information, interparty trust, procedural justice, joint governance, network capabilities, knowledge sharing, and alliance performance. All of the variables are measured with multi-items. Seven-point Likert scales are used. Five hundred and twenty-one questionnaires were mailed to Taiwanese firms with experience in strategic alliances. The respondents are companies’ managers, directors, or supervisors who are familiar with his/her firm’s alliance management. The informant was asked to choose one of the most significant alliances in the last five years. Of the 194 questionnaires returned, 3 responses contained incomplete data, and 9 respondents are not qualified. Therefore, 182 responses had complete data usable for analysis, yielding an effective response rate of 34.93%. In our 182 samples, 47.06% of their alliance forms are equity-based and 52.94% are contract-based alliances.

According to Armstrong and Overton’s (1977) suggestion, this study also tests non-response bias. We divide respondents into two groups of samples according their received time (the former 75% of entire response samples are the first group, and the later 25% respondents are the second group) to test non-response bias. Then, we use ANOVA test to compare sample means of the first wave respondents with the second wave respondents on firms’ age, capital, and firm size. No significant differences were detected between the two groups on any of these characteristics. Hence, non-response
bias does not appear to be an issue of concern in this study.

**Measures**

In this study, *interparty trust* is the belief that a partner's ability to perform according to the intentions and expectations of a relationship and not to defect (Luo, 2008; Perry, Sengupta, & Krapfel, 2004). We developed an eight-item construct to measure interparty trust, modified from Luo (2008) and Perry, Sengupta, & Krapfel (2004). The descriptions of measurements adapted in this study are as follows: (1) decision confidence, (2) preparing commitment, (3) abiding by agreement, (4) mutual support, (5) absence of opportunism, (6) consideration, and (7) honoring commitment. *Joint governance* is the extent to which alliance partners jointly forms formal institutional framework that guides interparty exchanges (Geringer & Hebert, 1989; Luo, 2008). Based on Luo (2008), we developed a five-item construct to measure joint governance. The descriptions of measurements adapted in this study are as follows: (1) adopting new policies, (2) corporate culture, (3) contractual governance, (4) cooperation governance, and (5) monitoring specification. *Procedural justice* is the extent to which the dynamics of the decision process are judged to be fair (Johnson, Korsgaard, & Sapienza, 2002; Kim & Mauborgne, 1998; Luo, 2008). We developed a six-item construct to measure procedural justice, which is modified from Luo (2008) and Johnson, Korsgaard, & Sapienza (Johnson, Korsgaard, & Sapienza, 2002). Procedural justice concerns the impact of procedure independent of outcomes; thus, measures of procedural justice focus on processes that do not involve direct control over decision outcomes (Johnson, Korsgaard, & Sapienza, 2002). The procedural justice measure also
included one measure of overall perceptions of procedural justice.

Our six-item measure for knowledge sharing was adapted from Kale and Singh (2007). Knowledge sharing involves the extent to which the knowledge being exchanged and disseminated individually and organizationally (Kale & Singh, 2007). According to the definition of Walter, Auer, & Ritter (2006), network capabilities refer to a firm’s abilities to initiate, maintain, and utilize relationships with various external partners. There are three dimensions for the measurement of network capabilities: coordination activities, relations skills, and partner knowledge. The six-item measure of coordination activities assesses synchronizing, planning, controlling, and conflict management activities in both inter-organizational and inter-functional settings; the measurement items were selected from the study by Walter, Auer, & Ritter (2006) and Kale & Singh (2000). The four-item measure of relational skills appraises the extent to which the company in an alliance is able to cultivate and shape close relationships. The measurement items were based on previous research by Medlin, Aurifeille, & Quester (2005) and Walter, Auer, & Ritter (2006). Partner specific knowledge was measured by four items capturing the availability of information related to network partners; the measurement items were selected on the basis of prior researches of Walter, Auer, & Ritter (2006) and Stephen & Coote (2007).

Despite the publication of numerous studies on alliance performance (e.g. Aulakh, Kotabe, & Sahay, 1996; Lane, Salk, & Lyles, 2001; Mohr & Spekman, 1994), no consensus exists on measuring this construct. Alliance performance has traditionally been subject to considerable debate regarding
the appropriate yardsticks to be used, due to the hybrid structures and transitory nature of alliances (Krishnan, Martin, & Noorderhaven, 2006); moreover, due to the obstacles of assessing performance in a consistent manner across a large sample of alliances (Gulati, 1999).

To circumvent such hurdles, many alliance researchers have reached a consensus that using managerial assessments to evaluate alliance performance might be a useful approach (Anand & Khanna, 2000; Aulakh, Kotabe, & Sahay, 1996; Isobe, Makino, & Montgomery, 2000). Such a measure has one main advantage: it provides a consistent or uniform way to measure performance across a large sample of alliances (Gulati, 1999). Geringer & Herbert (1991) demonstrate a positive correlation between alliance performance assessments based on this measure, and assessments based on other objective measures that use accounting or financial data. Therefore, managerial assessments of alliance performance has gained acceptance in most alliance research. In this study, we developed a seven-item construct to measure alliance performance using managerial assessments. Performance dimensions were selected on the basis of prior research (Kale, Dyer, & Singh, 2002; Krishnan, Martin, & Noorderhaven, 2006). The measurement items reflect (1) the extent to which the firm meets its alliance objectives, (2) the extent to which the alliance is seen as enhancing the competitive position of the firm, (3) the extent to which the firm acquires critical skills or capabilities from its alliance partner, (4) the extent to which the firm is satisfied with the financial performance of the alliance, (5) the extent to which the firm is satisfied with the overall performance of its alliance, (6) the extent to which the firm perceives its alliance partner to be satisfied with the financial performance of the alliance, and
the extent to which the firm perceives the alliance partner to be satisfied with the overall performance of the alliance.

**ANALYSIS AND RESULTS**

The path diagram in this study was estimated using structural equation modeling (SEM). SEM would seem to be a suitable statistical technique because a series of separate but interrelated dependence relationships were estimated simultaneously in this study. We use AMOS 5.0 program (1999) to generate all the estimates by using maximum likelihood technique.

**Assessment of Measurement Items**

*First-order factors*

The first-order construct in this study are interparty trust, joint governance, procedural justice, knowledge sharing, coordination, relation skills, partner knowledge, and alliance performance.

Table 1 reports the factor correlation matrix. The first step is to focus on the assessment of the measurement items and how well they specify the relations between the observed measures and their posited underlying constructs. Table 2 presents the estimates for each construct, as well as t-values to evaluate the significance of these loadings. We initially examine the reliability of constructs and use Cronbach’s $\alpha$ and composite reliabilities to check internal consistency of the measurement model. An inspection of Cronbach’s alpha for eight constructs reveals that all of the coefficients are greater than 0.70, which indicates acceptable reliability (Nunnally, 1978). Joreskog’s rho was also adopted to assess construct reliability. All of the rho values range from 0.76 to 0.96, which reaches the acceptable
threshold of 0.70.

Convergent validity is assessed by confirmatory factor analysis (CFA) to verify the unidimensionality. Fornell and Larcker (1981) suggest that convergent validity can be judged from the significance of factor loading and shared variance. As shown in Table 2, the constructs demonstrate sufficient convergent validity, as indicated by the factor loadings ranging from 0.64 to 0.93 at a significance level of 0.01 in t-test statistics, and also share variance coefficients ranging from 0.51 to 0.79. To assess discriminant validity, we followed Fornell and Larcker’s (1981) suggestion to compare the average variance extracted and the variance shared between the constructs.

Table 1 reports the correlation coefficients in the off-diagonal elements of the matrix and the square roots of the average variance extracted values calculated for each construct along the diagonal. To ensure adequate discriminant validity of a construct, its diagonal element should be greater than the off-diagonal elements in the corresponding rows and columns. All the constructs in our model fulfill the criteria.

Furthermore, the other goodness-of-fit indices suggest a good fit for the measurement model: Comparative Fit Index (CFI) = 0.930; Incremental Fit Index (IFI) = 0.931; Root Mean-Square Error of Approximation (RMSEA) = 0.077. Although the overall chi-square statistic for the measurement model is significant, this might be due to this test statistic’s sensitivity to sample size (Bagozzi & Yi, 1988; Stump & Heide, 1996). However, the ratio of $\chi^2$ to degrees of freedom (2.06, less than 3)
corresponds to a satisfactory fit (Hair, Anderson, Tatham, & Black, 2006). Overall, the measurement model revealed a reasonable model fit for the proposed factor structure.

Second-order factors (network capability)

In the concept framework, network capability is a higher-order construct composed of coordination, relation skills, and partner knowledge. To establish that network capability is a single second-order factor, the null hypothesis that the first-order factors can be converged to a single higher-order construct was tested (Calantone, Cavusgil, & Zhao, 2002). Table 3 reports that factor loadings from the measurement item to respecting first-order constructs range from 0.63 to 0.86. Factor loadings from first-order factors to the second-order factors range from 0.81 to 0.93. The ratio of chi-square to degree of freedom is 2.91, and CFI is 0.941. As can be seen, the model fits the data well.
**Assessment of Structural Model**

Having satisfied the requirement from measurement model, we further tested the structural model. Table 4 presents the results. The goodness-of-fit statistics indicate a satisfactory fit of the model. Although the chi-square statistic is significant (Satorra-Bentler-Scaled- \( \chi^2 = 299.09 \); Degrees of Freedom = 140 ; p-value < 0.001), the sufficiently low ratio of chi-square to degrees of freedom (2.14 less than 3) reports a satisfactory fit: CFI = 0.949, NNFI = 0.909, IFI = 0.949, RMSEA=0.079).

Of the three dimensions of innovation appropriability, the data analysis result displays a significant effect on knowledge sharing: joint governance (\( \gamma = 0.374, t = 2.145 \)) and procedure justice (\( \gamma = 0.252, t = 1.978 \)) in support of H2a and H3a respectively. The result of H1b (\( \gamma = 0.147, t = 2.076 \)) and H3b (\( \gamma = 0.277, t = 4.743 \)) suggest that interparty trust and procedure justice have positive influences on enhancement of network capabilities. The result of H4 (\( \gamma = 0.397, t = 6.723 \)) suggests that knowledge sharing has a positive influence on network capability enhancement. Last of all, the acceptance of H5 (\( \beta = 0.0582, t = 3.219 \)) and H6 (\( \beta = 1.617, t = 7.561 \)) indicate that both knowledge sharing and network capability contribute to alliance performance.

Table 4 goes about here.

**CONCLUSION**

**Discussion of Findings**

Contrary to our expectation, the path coefficient of H1a (interparty trust to knowledge sharing) is
negatively and not statistically significant. According to Langfred (2004)’s research, too much trust in a self-managing team can be harmful under some conditions. Langfred (2004) suggests that the more team members trust one another, the less they chose to monitor one another. When this condition is combined with high levels of individual autonomy, trust may have negative effects on trust-related performance. Since strategic alliances can be viewed as self-managing organizations which needed active involvements and higher individual autonomy of alliance partners, there may be negative effects of trust. One might infer that in contract-based alliances where two firms have to comply with contractual arrangements, the presence of collaboration routines can be considered highly probable, while the development of trust can be taken much less for granted. In the contrast, there might be higher levels of mutual trust among partners in equity-based alliances, an indispensable precondition and base for knowledge sharing, capability acquirement, and cooperation (Jiang & Li, 2009). As different alliance forms are not examined in this study, this might limit our explanations about this unexpected result.

According to Luo’s (2008) suggestion, joint governance provides clear and transparent incentives for knowledge sharing by creating a forum which is conducive to interparty exchanges. The empirical result of H2a is significantly supported. It indicates that well designed and well-enforced joint governance systems in alliances can facilitate knowledge sharing between partners. Furthermore, McEvily and Marcus’s (2005) suggest that joint governance has a direct influence on capability acquisition by providing an interactive forum for learning that allows firms to observe and experiment
with capabilities in practice. H2b predicted a positive relationship between joint governance and network capability. Although the expected sign is consistent with the result, this hypothesis is not significantly supported.

Both the path coefficients of H3a and H3b are significantly supported. The results indicate that procedural justice has statistical correlation with knowledge sharing and network capabilities. Both the path coefficients of H3a and H3b are significantly supported. We apply justice theory to investigate how procedural justice influence cooperation outcomes. Our empirical results indicate that procedural justice has positive influences on knowledge sharing and network capabilities. Procedural justice influences both the process and structure of interpartner exchange and may also add relational value of both parties for future cooperation (Luo, 2008). It also reduced relational risks arising from unilateral opportunism and private interest pursuit. With this confirmed finding, managers should integrate the role of procedural justice in alliance governance to enhance knowledge sharing and improve network capability.

H4 predicts the direct effects of knowledge sharing on network capability Consistent with the proposed hypothesis, the firms with higher level of knowledge sharing are more likely to have a higher level of network capability enhancement. Drawing on the literature of the “knowledge-based view” (Hennch, 2005; Janowicz-Panjaitan & Noorderhaven, 2008) and “network capabilities” (Ritter & Gemunden, 2004; Walter, Auer, & Ritter, 2006), we describe how knowledge sharing plays an important role in helping a firm to develop their alliance management know-how and improve their
partnering skills. The empirical finding supports this argument.

Firms are increasingly using alliances to acquire knowledge from their partners and to exploit useful knowledge to invest in alliance activities. By doing so, firms obtain superior alliance performance. The positive and significant empirical result based on H5 suggests that effective management of knowledge sharing among alliance partners may significantly enhance alliance performance. This is consistent with previous findings by Kale and Singh (2007).

As is proposed in H6, network capability appears to be positively correlated with alliance performance. Dyer’s (1996) case-based research indicates that some firms learn how to develop and manage alliances better than others. According to Ritter and Gemunden’s (2003) research, the impact of network capabilities on innovation success is also found to be significant. However, the studies about the influences of network capabilities on alliances are still limited. Therefore, our empirical result provides some insight into the role of network capabilities in shaping alliance performance.

**Limitations and Future Direction of Research**

Although this study provides some interesting findings, some limitations should be noted and suggest avenues for future research. The first limitation is that we collected data concerning the perspectives of both partners on alliances through a single-side survey from the Taiwan partners only. Geringer and Hebert (1991: 256) found a significant, positive correlation between a focal parent’s satisfaction with alliance performance and the perception by the other partner of this focal parent’s satisfaction. However, it would be more valuable to gain both partners’ perspectives on each alliance.
Traditionally, procedural justice research is usually scrutinized from a one-sided perspective. Nevertheless, according to Luo’s (2005) research results, shared procedural justice and unilaterally perceived procedural justice have different degrees of impact on relative performance. For cooperation aimed at collective achievements in alliances, shared procedural justice is more important for improving joint operations. Luo (2005) suggests that only when the shared procedural justice perceived by two parties in an alliance is the same, it is likely to maintain a sustained and stable relationship for further coordination. If justice perceptions are not common to all parties, conflicts behaviors may arise, since one party is likely to feel unfairly treated (Luo, 2005). However, the extents of procedural justice in this study are measured by unilateral views. The degree of justice perceptions between two parties may be inconsistent. This creates an important limitation

Reference


<table>
<thead>
<tr>
<th>Construct</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
<th>F5</th>
<th>F6</th>
<th>F7</th>
<th>F8</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1 Interparty Trust</td>
<td>0.86</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2 Joint Governance</td>
<td>0.59</td>
<td>0.89</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F3 Procedural Justice</td>
<td>0.58</td>
<td>0.61</td>
<td>0.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F4 Knowledge Sharing</td>
<td>0.21</td>
<td>0.27</td>
<td>0.29</td>
<td>0.81</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>F5 Coordination</td>
<td>0.36</td>
<td>0.42</td>
<td>0.44</td>
<td>0.30</td>
<td>0.77</td>
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<tr>
<td>F6 Relationship Skills</td>
<td>0.40</td>
<td>0.38</td>
<td>0.50</td>
<td>0.35</td>
<td>0.39</td>
<td>0.80</td>
<td></td>
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<tr>
<td>F7 Partner Knowledge</td>
<td>0.34</td>
<td>0.40</td>
<td>0.48</td>
<td>0.31</td>
<td>0.29</td>
<td>0.40</td>
<td>0.72</td>
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<tr>
<td>F8 Alliance Performance</td>
<td>0.55</td>
<td>0.54</td>
<td>0.57</td>
<td>0.29</td>
<td>0.37</td>
<td>0.29</td>
<td>0.33</td>
<td>0.92</td>
</tr>
</tbody>
</table>

*Note: Diagonal terms (in bold) are square root of the average variance extracted. Off-diagonal terms are the correlation of latent constructs. The diagonal term must be greater than any of the elements in the row or the column corresponding to that number.*
Table 2: Measurement model and confirmatory factor analysis

<table>
<thead>
<tr>
<th>Items</th>
<th>λ</th>
<th>t-value</th>
<th>α</th>
<th>ρ</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interparty Trust</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Both parties always rely on each other to abide by and carry out alliance agreements.</td>
<td>0.81</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Both parties have a high confidence level of each other’s commitment and contribution.</td>
<td>0.89</td>
<td>14.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our alliance partner usually keeps the promises they make to our firm.</td>
<td>0.88</td>
<td>14.26</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Generally, my firm trusts our partner.</td>
<td>0.92</td>
<td>15.33</td>
<td></td>
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</tr>
<tr>
<td><strong>Joint Governance</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Whenever the alliance contract needs alternation or renewal, both parties always work together on all related terms and clauses, and jointly monitor contract enforcement thereafter.</td>
<td>0.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contract terms on interparty cooperation, sharing, and exchange are clearly defined and well executed by both parties.</td>
<td>0.93</td>
<td>16.32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contract terms on directing, monitoring, and governing the alliance’s major activities are clearly defined and well executed by both parties.</td>
<td>0.91</td>
<td>15.53</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Procedural Justice</strong></td>
<td></td>
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</tr>
<tr>
<td>The procedures used to govern knowledge or resources sharing between two parties (i.e., knowledge transfer, innovation development, and resource contribution) are fair.</td>
<td>0.76</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>The implementation of strategic decisions is administered and monitored fairly by both parties.</td>
<td>0.86</td>
<td>12.36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall, the procedures used for making strategic decisions were fair.</td>
<td>0.91</td>
<td>13.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Knowledge Sharing</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Company management conducts a ‘collective review’ to assess the progress and performance of its strategic alliances.</td>
<td>0.64</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alliance managers participate in forums such as committees or task forces to take stock of their alliance management experience and practices.</td>
<td>0.89</td>
<td>9.51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company managers participate in forums such as meetings, seminars, or retreats to exchange alliance-related information, experiences, war stories, etc.</td>
<td>0.88</td>
<td>9.47</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Coordination</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We appoint coordinators who are responsible for the relationships with our partners.</td>
<td>0.69</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>We discuss regularly with our partners how we can support each other in our success.</td>
<td>0.74</td>
<td>9.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The partners engage in joint problem solving while resolving conflicts.</td>
<td>0.87</td>
<td>10.33</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Items</td>
<td>λ</td>
<td>t-value</td>
<td>α</td>
<td>ρ</td>
<td>AVE</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-----</td>
<td>---------</td>
<td>-----</td>
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<td>-----</td>
</tr>
<tr>
<td><strong>Relation Skills</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We can put ourselves in our partners’ position.</td>
<td>0.74</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our firm prefers to work out solutions to problems that benefit the</td>
<td>0.74</td>
<td>9.35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>relationship as a whole, and not only the individual parties.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In our firm’s past relationships, the parties have treated problems</td>
<td>0.67</td>
<td>8.47</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>as joint rather than individual responsibilities.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Partner Knowledge</strong></td>
<td></td>
<td>0.91</td>
<td>0.93</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>We know our partners’ products/procedures/services.</td>
<td>0.86</td>
<td>13.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We know our competitors’ potentials and strategies.</td>
<td>0.80</td>
<td>11.80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both parties were willing to provide proprietary information if it</td>
<td>0.86</td>
<td>13.34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>helped each other.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Alliance Performance</strong></td>
<td></td>
<td>0.96</td>
<td>0.96</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td>Our firm is satisfied with the financial performance of the</td>
<td>0.93</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>collaboration.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our firm is satisfied with the overall performance of the</td>
<td>0.91</td>
<td>15.97</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>collaboration.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our alliance partner firm seems to be satisfied with the financial</td>
<td>0.92</td>
<td>16.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>performance of the collaboration.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our alliance partner firm seems to be satisfied with the overall</td>
<td>0.93</td>
<td>16.30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>performance of the collaboration.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Note:** $\lambda =$ factor-loading lambda, $\alpha =$ Cronbach’s alpha, $\rho =$ Joreskog’s rho, AVE= average variance extracted., Measurement Fit: $\chi^2 = 559.375$, Degrees of Freedom =271; $p<0.001$; Comparative Fit Index (CFI) = 0.930; Bollen (IFI) Fit Index = 0.931; Root Mean-Square Error of Approximation (RMSEA) = 0.077, $N = 182$. 
Table 3: Network capability second-order measurement model

A. Standardized first-order loadings

<table>
<thead>
<tr>
<th>Items</th>
<th>λ</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coordination</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We appoint coordinators who are responsible for the relationships with our partners.</td>
<td>0.71*</td>
<td></td>
</tr>
<tr>
<td>We discuss regularly with our partners how we can support each other in our success.</td>
<td>0.74</td>
<td>8.93</td>
</tr>
<tr>
<td>The partners engage in joint problem solving while resolving conflicts.</td>
<td>0.86</td>
<td>9.81</td>
</tr>
<tr>
<td><strong>Relation Skills</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We can put ourselves in our partners’ position.</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>Our firm prefers to work out solutions to problems that benefit the relationship as a whole, and not only the individual parties.</td>
<td>0.80</td>
<td>11.47</td>
</tr>
<tr>
<td>In our firm’s past relationships, the parties have treated problems as joint rather than individual responsibilities.</td>
<td>0.79</td>
<td>11.34</td>
</tr>
<tr>
<td><strong>Partner Knowledge</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We know our partners’ products/procedures/services.</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>We know our competitors’ potentials and strategies.</td>
<td>0.76</td>
<td>9.01</td>
</tr>
<tr>
<td>Both parties were willing to provide proprietary information if it helped each other.</td>
<td>0.63</td>
<td>7.66</td>
</tr>
</tbody>
</table>

* Fixed Parameter

B. Standardized second-order loadings

<table>
<thead>
<tr>
<th>First Order Construct - Network Capability</th>
<th>Factor Loadings</th>
<th>t-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordination</td>
<td>0.84</td>
<td>8.39</td>
</tr>
<tr>
<td>Relational Skills</td>
<td>0.81</td>
<td>8.71</td>
</tr>
<tr>
<td>Partner Knowledge</td>
<td>0.93</td>
<td>10.67</td>
</tr>
</tbody>
</table>

Note: Measurement Fit: $\chi^2 = 69.920$, Degrees of Freedom =24; p<0.001; CFI = 0.941; NFI = 0.915; IFI = 0.942; RMSEA = 0.103
### Table 4: Structural parameter estimates and model fit indices

<table>
<thead>
<tr>
<th>Paths</th>
<th>Hypothesis (Expected direction)</th>
<th>Standardized Coefficient</th>
<th>T-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interparty Trust → Knowledge Sharing</td>
<td>H1a (+)</td>
<td>-0.243</td>
<td>-1.447</td>
</tr>
<tr>
<td>Interparty Trust → Network Capabilities</td>
<td>H1b (+)</td>
<td>0.147</td>
<td>2.076*</td>
</tr>
<tr>
<td>Joint Governance → Knowledge Sharing</td>
<td>H2a (+)</td>
<td>0.374</td>
<td>2.145*</td>
</tr>
<tr>
<td>Joint Governance → Network Capabilities</td>
<td>H2b (+)</td>
<td>0.122</td>
<td>1.659</td>
</tr>
<tr>
<td>Procedural Justice → Knowledge Sharing</td>
<td>H3a (+)</td>
<td>0.252</td>
<td>1.978*</td>
</tr>
<tr>
<td>Procedural Justice → Network Capabilities</td>
<td>H3b (+)</td>
<td>0.277</td>
<td>4.743**</td>
</tr>
<tr>
<td>Knowledge Sharing → Network Capabilities</td>
<td>H4 (+)</td>
<td>0.397</td>
<td>6.723**</td>
</tr>
<tr>
<td>Knowledge Sharing → Alliance Performance</td>
<td>H5 (+)</td>
<td>0.582</td>
<td>3.219**</td>
</tr>
<tr>
<td>Network Capabilities → Alliance Performance</td>
<td>H6 (+)</td>
<td>1.617</td>
<td>7.561**</td>
</tr>
</tbody>
</table>

**Model Fit Indices**

Satorra-Bentler-Scaled-χ² (140) = 299.090; p-value < 0.001; N=182

CFI = 0.949; NNFI = 0.909; IFI = 0.949; RMSEA = 0.079

**Note:** * = p< 0.05, ** = p< 0.01,