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Third-party relational governance and collaborative innovation performance: The role of IPR protection

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ABSTRACT

The purpose of this study is to explore the impact of third-party relational governance on the performance of collaborative innovation in China. By integrating the relational view and innovation appropriation perspectives, this study analyses the effects of three mechanisms of third-party relational governance—co-reputation, interorganizational routines, and technological norms—on collaborative innovation performance. Additionally, this study investigates the moderating effects of the protection of intellectual Property Rights (IPR) on the relationship between third-party relational governance and collaborative innovation performance. Survey data of high-technology firms in China are used to empirically test the hypotheses. The results show that third-party relational governance has a positive effect on collaborative innovation performance and that IPR protection has different moderating effects. This study contributes to the relational governance literature by adding the perspective of third parties and analyzing three mechanisms of third-party relational governance in a single model. This study also contributes to the innovation appropriation literature by examining the role of IPR protection in governing collaborative innovation in China. Finally, this study offers suggestions on how Chinese firms should govern their collaborative innovation to remedy the limitations of a weak IPR legal institutional framework.

1. Introduction

In open and dynamic industries, collaborative innovation has become an essential strategy for firms to develop the best innovations (Davis & Eisenhardt, 2011; Teece, 2006). These collaborative innovation projects use an open approach involving knowledge, technologies, and other resource combinations across organizational boundaries to innovate. However, despite their importance, many collaborative innovation projects fail to achieve their goals due to complicated governance challenges (Sørensen & Torfing, 2017). Previous research investigating collaborative innovation suggests that third parties may hold the key to remove several barriers emerging in collaborative innovation (Davis & Eisenhardt, 2011; Klerkx & Aarts, 2013).

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A third-party in collaborative innovation projects is an organization or body that acts as an agent or broker in any aspect of the innovation cooperation process between two or more parties (Howells, 2006). For instance, a research institution—Zhejiang Digital Home Industry Promotion and Application—acts as a common third-party for its partner firms, governs complex cooperation relations to promote the engagement of each partner firm, controls opportunistic behaviors, and ensures that each partner benefits from this collaboration. However, the governance role of third parties in improving collaborative innovation remains under-investigated.

The relational governance literature provides some insights into the role of third parties in governing collaborative innovation. The relational view suggests that relational governance is a social institution that governs and guides exchange partners on the basis of cooperative norms and collaborative activities (Dyer & Singh, 1998; Heide & John, 1992; Macneil, 1980; Zaheer & Venkatraman, 1995). Relational governance safeguards parties from the risk of opportunism, thus enhancing coordination, lowering transaction costs, and improving exchange performance (Dyer, Singh, & Hesterly, 2018; Dyer & Singh, 1998). However, research concerning relational governance, which mostly adopts the dyadic relationship perspective, has some limitations in explaining the influence of third parties on the performance of collaborative innovation (Poppo, Zhou, & Zenger, 2008; Zahra, Yavuz, & Ucbasaran, 2006). How third-party relational governance may lead to improved collaborative innovation is unclear. Our study intends to address the literature gaps and explore the mechanisms of third-party relational governance that lead to successful collaborative innovation in the following ways.

First, the relational governance literature primarily analyzes the effect of governance mechanisms in dyadic relationships between focal firms and their partners, while largely overlooking the influence of third parties. However, third parties play an important coordinating role in collaborative innovation (Fichter & Beucker, 2012; Markham, Ward, Aiman-Smith, & Kingon, 2010). Third parties can be industrial associations, research institutions, or government organizations (Howells, 2006). Previous studies often treat interfirm cooperation as a collection of independent dyads and neglect the possibility of third parties' influence on collaborative innovation behaviors (Davis, 2016).

Furthermore, existing studies investigating the impact of third parties mostly adopt the structural perspective. Based on network embeddedness theory (Granovetter, 1985), these studies regard third-party as a "structural hole" (Burt, 1992) in the collaboration network that can leverage its network structural position as a broker of technology transfer. However, some studies have called for additional research concerning the relational governance functions of third parties beyond their structural functions. For example, Obstfeld, Borgatti, and Davis (2014) decoupled third-party actions from social network structures in terms of *tertius iungens* (or "third who joins") strategic orientation.

This study proposes that third-party relational governance underpins the success of collaborative innovation. Here, third-party relational governance is defined as a social institution used by third parties to govern the cooperative relations and activities in multi-partner collaborative innovation. This study highlights the governing role of third parties in improving the interaction and cooperation between focal firms and their partners. By considering the relational governance impact of third parties, we can obtain a better understanding of the nature of cooperation dynamics between focal firms and their partners. As a common node of interorganizational relationships, third parties are able to orchestrate multiple collaborative relationships (Obstfeld, 2005). In this way, a third-party finds way to bring all partners together to engage in mutually beneficial collaborative innovation. One prime example is Hua Yuan Science and Technology Association in Silicon Valley, California, USA, which brokered the partnership between Alibaba and Yahoo in 2005, allowing Alibaba to access much needed funding from Yahoo to launch its innovative activities.

Second, an overarching perspective of third-party relational governance is ignored in many studies. The relational governance literature discusses several informal relational safeguard mechanisms including reputation (Davis, 2016; Dyer & Singh, 1998; Jones, Hesterly, & Borgatti, 1997), interorganizational routines (Zollo, Reuer, & Singh, 2002), and norms (Dyer & Singh, 1998; Ferguson, Paulin, & Bergeron, 2005). However, these mechanisms are analyzed individually rather than holistically. For example, Davis (2016) explores the role of partner firms' reputation in the innovation ecosystem. In fact, the performance of collaborative innovation may not be determined by one single governance mechanism but by a combination of multiple mechanisms. Furthermore, these relational governance mechanisms are defined as safeguards used by partner firms per se rather than third parties. The specified relational governance mechanisms used by third parties remain unexplored.

Drawing upon the relational governance literature (Dyer et al., 2018; Dyer & Singh, 1998; Poppo & Zenger, 2002) and case evidence from the Chinese high-technology industry, we propose that third-party relational governance is a multi-dimensional construct involving co-reputation, interorganizational routines, and technological norms. Successful collaborative innovation requires not only the commitment of each partner but also the efficiency of coordination by decreasing the transaction cost. Co-reputation provides an incentive for the institution promoting commitment among partner firms, representing an "internally-driven" governance mechanism. On the other hand, as "externally-driven" governance mechanisms, interorganizational routines and technological norms help reduce the coordination cost by focusing on the organization and technology, respectively. Co-reputation is defined as a reputation mechanism used by third parties to provide interorganizational endorsement (Stuart, Hoang, & Hybels, 1999) to the partners involved, bind the reputations of the partners together, and create a common identity. Interorganizational routine is defined as a negotiation routine used by third parties for task division (Zollo et al., 2002). Technological norms refer to the standards or procedures used by third parties to govern technological interfaces (Nambisan & Sawhney, 2011) among co-innovation partners. As an extension of the relational governance literature, this multi-dimensional construct enables us to capture the entire picture of the influence of third-party relational governance on collaborative innovation performance.

Third, while relational governance represents the value creating process of collaborative innovation, the protection of intellectual Property Rights (IPR) of collaborative innovation outcomes as a value appropriation governance is equally important. The proliferating research on collaborative innovation has focused almost entirely on the value creation effects of relational governance, while overlooking value appropriation considerations (Bogers et al., 2017). A major threat to co-innovation success could be the lack of a robust IPR regime. For instance, the weak IPR protection system in China hampers collaborative innovation among firms (Peng, Ahlstrom, Carraher, & Shi, 2017). When the IPR protection system is underdeveloped, there is a high risk associated with firms sharing knowledge to create more innovative products or services in collaboration, as this may lead to the loss of intellectual property, thus affecting the outcomes of such collaboration.

In this study, we analyze the moderating effect of IPR protection on the relationship between third-party relational governance and collaborative innovation performance, integrating the perspectives of value creation and value appropriation in a single theoretical model, thus contributing to the innovation appropriation literature (Contractor & Woodley, 2015; Dyer, Singh, & Kale, 2008; Teece, 2018).

In summary, this study contributes to the relational governance literature (Dyer et al., 2018; Dyer & Singh, 1998; Poppo & Zenger, 2002) from the perspective of third parties, and extends beyond the dyadic relational analysis in this realm of research. We propose a multi-dimensional construct of third-party relational governance involving co-reputation, interorganizational routines, and technological norms. Furthermore, we extend the literature by investigating the moderating role of IPR protection by combining value creation and value appropriation governance in a single theoretical model. The rest of the paper proceeds as follows. Following the introduction, in section 2, we draw on the relational view and innovation appropriation literature to develop our theoretical model and research hypotheses. Section 3 details the empirical study, and section 4 presents the results of the empirical tests. In section 5, we discuss the theoretical and practical implications of our findings and the future research agenda.

2. Theoretical framework and hypotheses

2.1. Third-party relational governance and collaborative innovation performance

A central challenge in governing multi-partner collaborative innovation is that each partner has its own well-established process for innovation, which may involve repeated confusion, conflict, and opportunistic behaviors during Research and Development (R&D; Davis & Eisenhardt, 2011). As a common node for multiple partners, third parties are better equipped to address these governance challenges. For example, in the Digital Home project, Company H, a leading company in media, information, and communication industry in China, cooperates with partners from various industries, including information and communications technology, engineering, security monitoring, property management, and terminal equipment manufacturing, to research and develop new smart home solutions. A research institution—Zhejiang Digital Home Industry Promotion and Application—as the common third-party for these partner firms, governs the complex cooperation relations to promote engagement of each partner firm, controls the opportunistic behaviors, and ensures that each partner benefits from this collaboration.

Drawing upon the relational governance literature (Dyer et al., 2018; Dyer & Singh, 1998; Poppo & Zenger, 2002) and case evidence from the Chinese high-technology industry, we propose three dimensions of third-party relational governance, namely, co-reputation, interorganizational routines, and technological norms. We argue that these three dimensions of third-party relational governance are able to enhance the performance of collaborative innovation.

Co-reputation refers to a reputation mechanism used by third parties to provide interorganizational endorsement (Stuart et al., 1999) for the partners involved. Co-reputation binds the reputations of the partners together and creates a common identity. Co-reputation positively impacts the performance of collaborative innovation because of the following reasons.

First, co-reputation provides reputation signals to the partners (Bayne, Schepis, & Purchase, 2017; Obstfeld et al., 2014) to control opportunistic behaviors in collaborative innovation. Obstfeld et al. (2014) find that the endorsement of third parties provides an incentive to partner firms to behave in a more trustworthy fashion. Third parties may facilitate a flow of reputation-related information regarding the parties' behavior throughout collaborative projects (Fichter & Beucker, 2012; Jones et al., 1997). Co-reputation increases the transparency of partners' behavior (Davis, 2016). Partners are motivated to engage in collaborative innovation if these engagement behaviors can be more transparent and rewarded by improvement in the partners' reputation (Rindova, Williamson, Petkova, & Sever, 2005).

Second, through co-reputation, third parties may encourage partner firms to invest in relationship-specific assets (Dyer & Singh, 1998), such as knowledge and human resources, because partner firms are concerned about their reputation in the long run and the long-term benefits associated with their reputation. These relationship-specific investments may promote a sense of belongingness during the collaborative innovation process, which may create a positive loop, as partner firms may then regard collaborative tasks as their own critical responsibility (O'Mahony & Ferraro, 2007). Thus, partners have a greater tendency to internalize collaborative innovation tasks into their own organizations and invest more resources to help each other in collaboration. Therefore, the co-reputation mechanism provides an elegant solution to the collective action problem (Zaggl, 2017). This mechanism leads to more innovation-related input and risk taking during the co-innovation process. Therefore, we hypothesize the following:

Hypothesis 1. Co-reputation used by third parties has a positive effect on collaborative innovation performance.

Interorganizational routines are negotiation routines used by third parties for task division (Zollo et al., 2002). These routines include decision-making procedures, monitoring systems, and resource allocation rules to coordinate all co-innovation activities. Such routines enhance the performance of collaborative innovation for the following reasons.

First, interorganizational routines increase the efficiency associated with complicated organizational processes. Such routines establish negotiation routines among partners and help clarify co-innovation tasks, solve problems, and resolve conflicts during collaboration (Zollo et al., 2002), thereby enhancing the foundation for interorganizational coordination and communication. These routines can support interorganizational integrative operations, such as cross-functional teams (Helfat & Raubitschek, 2018; Aggarwal, Siggelkow, & Singh, 2011; Bogers, 2011). Based on such interorganizational routines, third parties can establish an effective administration system to tremendously decrease the cost of coordination among various partners. Nambisan, Lyytinen, Majchrzak, and Song (2017) find that to exert co-innovation efforts, the partners need to align their internal processes with the collaborative innovation process. They also need to configure their interorganizational routines to enable successful interaction and cooperation in collaborative innovation.

Second, interorganizational routines can promote engagement among partners by smoothing complicated interactions and facilitating the partners' commitment during the co-innovation process. With commonly defined interorganizational routines, the coordination process among multiple partners is likely to be smoother, and innovation tasks are likely to be easier to undertake, which leads to greater engagement in innovation activities (Nambisan & Sawhney, 2011). Interorganizational routines are likely to encourage partners to devote greater efforts in developing new solutions rather than settling conflicts (Davis & Eisenhardt, 2011). If one partner proposes a new requirement for co-innovation tasks, the other partner might feel more confident in applying its abilities and resources to develop new solutions, given the clarified blueprint for operations. If cooperation processes are well managed, partners may have better experiences cooperating with other members (Nambisan & Sawhney, 2011). The partners may invest more resources in completing tasks and helping one another focus on innovation outcomes. Therefore, we hypothesize the following:

Hypothesis 2. Interorganizational routines used by third parties have a positive effect on collaborative innovation performance.

Technological norms refer to the standards or procedures used by third parties to govern the technological interfaces (Nambisan & Sawhney, 2011) among co-innovation partners. In this study, technological norms particularly concern technology interface coordination, which differs from interorganizational routines concerning organizational process coordination. Such norms include technological support, a project-based technology pool, networking tools, technology protocols, a common technology language, and so on. Such norms enhance the performance of collaborative innovation for the following reasons.

First, technological norms increase the efficiency associated with complicated technology interface coordination by enhancing the technological compatibility of the partners. Technological incompatibility is an important obstacle to collaborative innovation (Krohn, Layton, & Weingart, 2012). Technological norms may increase technological compatibility by creating a common technology language, compatible technological subunits, or common technology standards (Nambisan & Sawhney, 2011). Through technological norms, third parties can decrease the high costs of the inter-operable process and uncertainty in technological coordination.

Second, technological norms increase the efficiency by increasing the transparency of the partners' cooperation behavior. Disorder and misunderstanding are common in collaborative innovation due to the nature of invisibility (Bogers, 2011). Technological norms provide more visible tools, allowing the partners to coordinate their interactions (Nambisan & Sawhney, 2011). Such norms create appropriate incentives, encouraging the partners to be transparent and not to free ride on the other partners' knowledge (Dyer & Singh, 1998). Once partners conform to standard or transferable technical rules, they will become more reliable at contributing new knowledge. Technological norms reduce technological uncertainty in cooperation and, thus, encourage the partners to be more amenable to engage in knowledge transfer, leading to higher collaborative innovation performance.

Third, technological norms promote interfirm learning by increasing the partner-specific absorptive capacity (Dyer & Singh, 1998). This capacity could lead collaborating firms to systematically obtain valuable knowledge from different partners, absorb external knowledge, and solve technological coordination problems (Nambisan & Sawhney, 2011). Technological norms facilitate partners to develop overlapping knowledge bases (Szulanski, 1996). Such norms constitute a critical component for integrating multi-disciplinary technical knowledge in collaborative innovation (Perkmann & Schildt, 2015). Through technological norms, third parties bring together partners with different knowledge bases (Agogué, Yström, & Le Masson, 2013) and shape the knowledge base of collaborative innovation, which helps the partners interact at diversified interfaces and generates new products or services by leveraging and recombining the knowledge of each partner. Therefore, collaborative innovation projects can leverage diversified knowledge from different partners to achieve common goals for the success of collaborative innovation. Hence, we hypothesize the following:

Hypothesis 3. Technological norms used by third parties have a positive effect on collaborative innovation performance.

2.2. The moderating role of IPR protection

The three relational governance mechanisms discussed above focus on value creation in collaborative innovation projects. However, such a value creating process is influenced by the value appropriation governance of the collaborative innovation, which is represented by IPR protection in this study. Specifically, how the intellectual properties and outcomes of collaborative innovation projects are protected and how the innovation outcomes are distributed among partner firms influence their engagement in the cooperation.

To ensure long term viability and sustainability in collaborative innovation, the partners in projects must act to ensure that the value created is distributed equitably and is perceived as such by all partners (Contractor & Woodley, 2015; Dyer et al., 2008; Teece, 2018). These distributions are often complicated by the fact that collaborative innovation outcomes are uncertain and difficult to measure (Dyer et al., 2008). Thus, IPR protection becomes a critical mechanism ensuring the protection and equitable sharing of innovation outcomes (Bogers, 2011).

In this study, IPR protection refers to measures or strategies allowing firms to benefit from a co-innovated outcome or share knowledge in collaborative projects by preventing misappropriation by other partners (Hurmelinna-Laukkanen, Olander, Blomqvist, & Panfilii, 2012). Given that there may be high variability in the outcomes of collaborative innovation activities, and that different partners may accrue different benefits from the same outcome (Dyer et al., 2008; Teece, 2018), IPR protection has a strong impact on voluntary cooperation and discourages the hoarding of benefits (Bogers, 2011). Thus, we argue that the co-innovation behaviors of partners are shaped not only by the third-party relational governance but also by IPR protection, which is the institutional framework that determines how innovation outcomes are accessed, protected, and distributed, thus, moderating the relationship between third-party relational governance and collaborative innovation performance.

The literature has already emphasized the critical role of IPR protection in collaborative innovation (Lichtenthaler, 2010; Manzini & Lazzarotti, 2016; Teece & Pisano, 2007). The commitment of partner firms during the co-innovation process increases with IPR protection (Manzini & Lazzarotti, 2016), which enhances the impact of co-reputation on collaborative innovation performance. Specifically, IPR protection is able to mitigate partner firms' concerns related to free-riding and other types of opportunistic behavior in collaborative innovation (Nambisan & Sawhney, 2011). Therefore, IPR protection complements co-reputation by limiting opportunistic expropriation from collaborative innovation outcomes (Miozzo, Desyllas, Lee, & Miles, 2016). Second, IPR protection reinforces the effect of co-reputation by providing sufficient protection for relationship-specific investments from partner firms. Partner firms are more likely to invest in relationship-specific assets if they are certain that co-innovation outcomes will be properly protected (Brander, Cui, & Vertinsky, 2017). However, if IPR protection is weak, firms with the most valuable assets or the most potential to contribute are less likely to participate in the cooperation. We therefore hypothesize the following:

Hypothesis 4. IPR protection positively moderates the relationship between co-reputation and collaborative innovation performance.

In settings of collaborative innovation where multiparty relationships are difficult to orchestrate and uncertain innovation outcomes are hard to protect (Davis, 2016), IPR protection decreases the coordination cost by providing a certain boundary of collective innovation outcomes and benefits (Manzini & Lazzarotti, 2016). The protection of IPR can improve the efficacy of interorganizational routines by fully negotiated appropriation principles adapted to align the diverging interests of the partner firms. Such protection helps shape common foundations within a collaborative innovation project to increase the levels of a shared understanding and mutuality among the partners (Ritala, Agouridas, Assimakopoulos, & Gies, 2013). Interorganizational routines may only facilitate the administration of cooperation processes but do not guarantee a mutually acceptable appropriation of co-innovation outcomes, which is the goal of an IPR regime. Thus, the IPR regime complements the limitations of interorganizational routines.

Second, the combination of interorganizational routines and IPR protection may deliver greater innovation performance than either mechanism in isolation (Poppo & Zenger, 2002). The protection of IPR complements the effects of interorganizational routines by developing the foundation of knowledge-sharing routines (Bogers, 2011). Partners not only need a behavior template to share their knowledge but also need motivation to increase their willingness to share knowledge. The protection of IPR influences a firm's choice of whom it is willing to work with and how it organizes knowledge-sharing activities with its partners (Teece, 2018). This will reduce the concern regarding the free-ride behaviors of partners, who will actively contribute to the projects by investing new knowledge or resources (Nambisan & Sawhney, 2011). Therefore, we hypothesize the following:

Hypothesis 5. IPR protection positively moderates the relationship between interorganizational routines and collaborative innovation performance.

Prior studies have shown that IPR protection does serve to reduce appropriability fears when the partners develop their individual technological capabilities through collaboration (Nambisan & Sawhney, 2011). The protection of IPR likely reduces the coordination cost and enhances innovation efficiency by motivating partner firms to be more transparent in their innovation activities (Manzini & Lazzarotti, 2016). The protection of IPR reinforces the effect of technological norms on increasing innovation effectiveness. Better IPR protection would likely allow partner firms to be more willing to share their technological knowledge and assets (Nambisan et al., 2017), thereby facilitating the faster and more cost-effective

development of new products and services. Furthermore, IPR protection provides institutional foundations for establishing technological norms, including common standard codes, creating a compatible technological interface, and developing better innovation methodologies among the partners (Nambisan & Sawhney, 2011).

Second, IPR protection influences the extent of innovation leverage (Nambisan & Sawhney, 2011) achieved in a collaborative innovation project, and mitigates the concerns of partner firms regarding "free riding" and other opportunistic behaviors (Teece, 2006). Thus, IPR protection encourages the partner firms to allow the other firms to leverage their innovation assets for collaborative innovation. The partner firms are likely to adopt a more open approach and seek opportunities to leverage one another's assets (Nambisan & Sawhney, 2011). By improving innovation leverage in collaborative projects, IPR protection increases the efficiency of complicated technology alignment and reinforces the impact of technological norms on collaborative innovation performance. Therefore, we hypothesize the following:

Hypothesis 6. IPR protection positively moderates the relationship between technological norms and collaborative innovation performance.

We depict the conceptual model in Fig. 1.

3. Research method

3.1. Sample and procedures

We chose the Chinese setting for the following reasons: 1) China has implemented "Mass Entrepreneurship and Innovation by All" as the national strategy for economic restructuring and growth for the next several decades (Ahlstrom, Yang, Wang, & Wu, 2018). According to a McKinsey study, China needs to generate a 2%–3% increase in annual GDP directly from innovation and new ventures to sustain a 5.5%–6.5% increase in annual GDP for the next decade.[1] 2) In a number of industries, particularly in high-technology industries, many Chinese companies are starting to form collaborative innovation projects to access valuable resources and increase their innovation success rate (Su, Zheng, & Chen, 2018). However, despite some well-publicized cases, few collaborative innovation projects have been successfully sustained (Wang, 2016), which provides a live laboratory to study this phenomenon. 3) China is notorious for its weak IPR protection regime.

We conducted a survey of firms' collaborative innovation projects in China with the support of several government organizations, including the Zhejiang Torch Center, the Zhejiang Provincial Development and Reform Commission, and the Hangzhou Municipal Development and Reform Commission. The high-technology industry is increasingly becoming a critical driving force for the Chinese economy. According to the China National Bureau of Statistics, in 2017, the added value of high-technology manufacturing increased by 13.4% year-on-year. The R&D expenditure of high-technology companies accounts for 47.1% of R&D expenditure of all companies in China. The authorized number of patent applications for invention by high-technology companies accounts for 18.2% of the total authorized number of patent applications for invention in China. With 270 valid patent applications for invention per 10,000 practitioners in high-technology industries, this numbers accounts for more than 27 times the national average. This number is in stark contrast with the number of patent applications for inventions a decade ago (Sawang, Zhou, & Yang, 2017). The growth and success of Chinese high-technology companies depend on their innovation collaborations with industrial partners, universities, and research institutions. These provide us with rich research data.

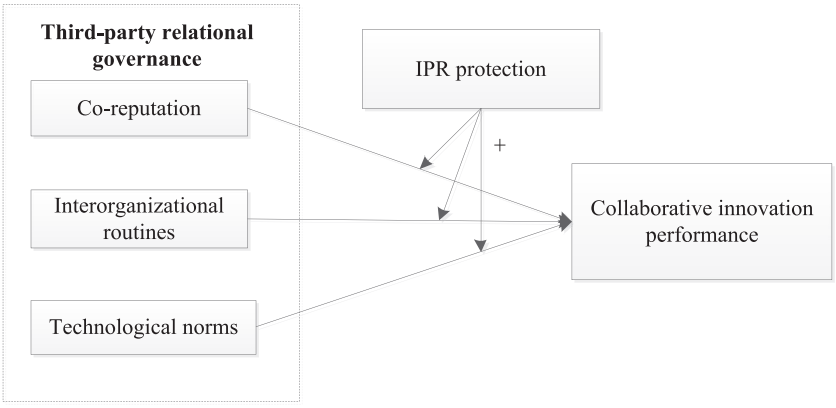

Fig. 1. Conceptual model.

[1] McKinsey Global Institute, The China Effect on Global Innovation, October 2015.

The survey was conducted to capture respondent companies' coordination activities, engagement level, and project performance. The questionnaire administration and field work occurred between November 2014 and April 2015. We obtained access to more than 500 potential respondents with the support of the abovementioned government organizations. The respondents included in the study met the following criteria: (1) their firms had at least one collaborative innovation project, and (2) each firm had at least two partners involved in that project. This gave us enough data to measure the third parties' activities.

Senior innovation managers, innovation project managers, and top managers were selected as key informants because they are highly familiar with their firms' relationships with major partners. They were assured of the confidentiality of their responses and were promised a summary report as an incentive. The interviewers were trained to conduct the survey on-site or by email. The respondents were instructed to focus on their major partners in a collaborative innovation project when answering the survey questions.

The respondents' firms belonged to a variety of industries, including culture and creativity,[2] finance, information and software, e-commerce, modern logistics, energy, detection technology, and technology enterprise services. We received data from 244 respondents. We conducted our analysis on a total of 221 responses after dropping 23 firms because of missing data; thus, the effective response rate was 44.2%. The unit of analysis in this study is collaborative innovation projects. Respondents from focal firms were asked to report one collaborative innovation project. Thus, we had a sample of 221 collaborative innovation projects. Table 1 shows the summary of this sample of projects. To assess potential response bias, we compared the characteristics of the participating and nonparticipating companies using multivariate analysis of variance. The results revealed no significant differences between them in terms of industry type, firm ownership, number of employees, or sales revenues (Wilk's $\lambda = 0.93$; $F = 1.3$), suggesting that response bias was not a major concern in this survey.

3.2. Measures

3.2.1. Third-party relational governance

The independent variable was third-party relational governance, which has the following three dimensions: co-reputation, interorganizational routines, and technological norms. We measured third-party relational governance using the items adapted from Fichter & Beucker, 2012. We measured co-reputation, interorganizational routines, and technological norms separately to evaluate third-party governance activities. We asked the respondents to rate the third-party relational governance activities of the collaborative innovation projects, using a 5-point Likert scale, ranging from 'strongly disagree' to 'strongly agree,' based on questions, such as "The third parties provide endorsement for new partners" (see Appendix Table A1 for item details).

3.2.2. Collaborative innovation performance

We used items developed by Chen, Tsou, and Ching (2011) to measure collaborative innovation performance (see Appendix for item details). We asked our respondents to rate the innovation performance of their collaborative innovation projects. This rating reflected the quality of the co-innovation relationships in the project and the results of these collaborative innovations.

Table 1
Summary of the sample of collaborative innovation projects (N = 221).

Item	Scale	Sample	Percentage (%)	Cumulative Percentage (%)
Cooperation time	Less than 6 months	50	22.6	22.6
	7–12 months	127	57.5	80.1
	13–24 months	21	9.5	89.6
	25–36 months	13	5.9	95.5
	More than 36 months	10	4.5	100
Number of partners	2	59	26.7	26.7
	3	56	25.3	52
	4	45	20.4	72.4
	5	47	21.3	93.7
	More than 5	14	6.3	100
Partner type	Peer company	78	35.3	/
	University/Research institution	64	29.0	/
	Supplier	47	21.3	/
	Customer	40	18.1	/
	others	49	22.2	/

[2] Cultural and creative industries encompass a range of economic activities that are concerned with the generation or exploitation of knowledge and information, comprising advertising, architecture, art, crafts, design, fashion, film, music, performing arts, publishing, R&D, software, toys and games, TV and radio, and video games.

3.2.3. IPR protection

The moderating variable was IPR protection and was defined as the intellectual property mechanisms that aim to protect the knowledge assets and innovation outcomes of collaborative innovation projects. According to Blind et al. (2003) and Hurmelinna-Laukkanen and Puumalainen (2007), the IPR protection scale examines how well IPR are protected in collaborative innovation projects on questions such as "We have strong control over the leakage behavior of project members" (see Appendix Table A1 for item details).

3.2.4. Control variables

We considered two types of control variables. The first was project duration (in number of months) as a project level control. The second was firm-level controls, including R&D intensity, firm revenue (logarithm of last year's sales revenue), firm age (number of years), firm size (logarithm of the number of employees in the company), ownership, and previous innovation performance (measured on a 5-point Likert scale).

3.2.5. Construct validity

The convergent and discriminant validity of the measures was tested using a confirmatory factor analysis, and the results are reported in the Appendix Table A1. First, the model fit indices indicated that overall, the measurement model fit the data satisfactorily (goodness-of-fit index = 0.91, comparative fit index = 0.93, incremental fit index = 0.93; root mean square error of approximation = 0.08). Second, all factor loadings were large and significant ($p < 0.01$), suggesting unidimensionality and convergent validity. Third, all composite reliabilities were greater than the 0.70 threshold, and the Average Variance Extracted (AVE) for each construct was above the 0.50 threshold (Fornell & Lacker, 1981). Thus, the scales displayed adequate reliability and convergent validity. Finally, to assess discriminant validity, we followed the procedure of Fornell and Lacker (1981) and found that the square interconstruct correlation was less than the AVE for each construct, supporting the discriminant validity.

3.2.6. Common method bias

We addressed the potential concern of common method bias with both procedural and statistical remedies. First, following Podsakoff, MacKenzie, Lee, and Podsakoff (2003), we obtained measures of the predictor and criterion variables from different sources. The innovation performance of collaborative projects was obtained from top managers, while the governance mechanisms and IPR protection were obtained from project managers or innovation managers. Second, Harman's single-factor test was performed to address the issue of common method variance using an exploratory factor analysis. The results showed that the first factor accounted for 22.46% of the covariance, thus rejecting the assumption that one general factor could account for the majority of the covariance among the measures. Therefore, common method bias was not a major concern in our analysis. Table 2 shows the descriptive statistics of the variables as well as correlations among the variables used in the estimation.

4. Model specification and data analysis

4.1. Model specification

We tested the hypotheses using a moderated regression analysis. To address possible multicollinearity between the interaction terms and their components, we mean-centered the variables (co-reputation, interorganizational routines, technological norms, and IPR protection) before constructing their interaction terms. As a result, the maximum value of the variance inflation factors in all the regression models was 2.8, well below the 10.0 cut-off, indicating that multicollinearity was not a serious concern. We ran a series of models, and the results are reported in Table 3. As Model 1 shows, the control variables explained 14.9% of the variance in innovation performance. Adding independent variables to Model 4 increased the R^2 to 49.6%. Adding the interaction terms to Model 7 further increased the R^2 to 60.7%.

Table 2
Descriptive statistics and correlations among study variables (N = 221).

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
1 Project time	14.69	13.833	1										
2 Age	12.615	10.47	0.148*	1									
3 Size	2.133	0.853	0.092	−0.240**	1								
4 Revenue	3.783	1.247	0.105	−0.023	0.107	1							
5 R&D intensity	8.582	6.89	0.077	0.119	−0.109	−0.001	1						
6 Previous innovation performance	3.934	0.879	0.118	0.193**	−0.024	0.086	0.522**	1					
7 Co-reputation	3.830	0.941	0.116	0.038	0.032	0.089	0.259**	0.294**	1				
8 Interorganizational routines	3.955	0.779	0.037	0.019	0.032	0.025	0.264**	0.289**	0.466**	1			
9 Technological norms	3.486	0.932	0.127	0.075	0.050	0.092	0.306**	0.388**	0.446**	0.552**	1		
10 IPR protection	3.601	0.771	0.091	0.106	−0.012	0.106	0.233**	0.254**	0.314**	0.391**	0.493**	1	
11 Collaborative innovation performance	3.510	0.938	0.078	0.000	0.063	0.116	0.220**	0.339**	0.494**	0.603**	0.702**	0.530**	1

Notes: *p < 0.05, **p < 0.01.

Table 3
Standardized regression coefficient estimates.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Project time	−0.042	−0.048	0.002	−0.036	−0.038	−0.046	−0.038
	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Age	−0.038	−0.004	−0.019	−0.058	−0.072	−0.053	−0.072
	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Size	0.051	0.039	0.014	−0.004	0.004	0.007	0.004
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Revenue	0.087	0.058	0.058	0.040	0.041	0.056	0.041
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R&D intensity	0.059	0.001	−0.046	−0.073	−0.064	−0.050	−0.064
	(0.010)	(0.009)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
SOE	−0.095	−0.053	−0.052	−0.122	−0.096	−0.123	−0.096
	(0.414)	(0.378)	(0.334)	(0.289)	(0.289)	(0.289)	(0.287)
POE	−0.226	−0.154	−0.045	−0.084	−0.090	−0.100	−0.090
	(0.377)	(0.344)	(0.306)	(0.265)	(0.266)	(0.266)	(0.262)
Previous innovation performance	0.350***	0.248***	0.149	0.057	0.050	0.050	0.050
	(0.086)	(0.080)	(0.072)	(0.063)	(0.064)	(0.064)	(0.063)
Co-reputation		0.413***	0.227***	0.134**	0.137**	0.148**	0.137**
		(0.062)	(0.060)	(0.053)	(0.055)	(0.057)	(0.057)
Interorganizational routines			0.475***	0.287***	0.245***	0.240***	0.245***
			(0.074)	(0.069)	(0.069)	(0.076)	(0.075)
Technological norms				0.490***	0.528***	0.482***	0.528***
				(0.058)	(0.058)	(0.058)	(0.060)
Co-reputation × IPR					−0.036	−0.035	−0.036
					(0.060)	(0.060)	(0.059)
Interorganizational routines × IPR						−0.059	−0.149*
						(0.056)	(0.067)
Technological norms × IPR							0.162*
							(0.071)
ΔF	4.602***	44.318***	59.770***	72.611***	0.803	1.254	6.328*
R^2	0.149	0.298	0.355	0.496	0.592	0.594	0.607
Adjusted R^2	0.117	0.268	0.328	0.475	0.568	0.569	0.580
ΔR^2	0.149	0.149	0.057	0.141	0.002	0.002	0.012
DW							1.814

Notes: *p < 0.05, **p < 0.01, ***p < 0.001. The number in bracket is the standard error. SOE = State-Owned Enterprises; POE = Private-Owned Enterprises; ΔF = F Change; ΔR2 = R Square Change; DW = Durbin-Watson test.

4.2. Hypotheses testing

We used Models 2, 3, and 4 to test Hypothesis 1, Hypothesis 2, and Hypothesis 3. The results showed that the positive coefficient was significant; thus, Hypothesis 1, Hypothesis 2, and Hypothesis 3 were supported.

Models 5, 6, and 7 present the results of the moderating effects of IPR protection on the relationship between third-party relational governance and collaborative innovation performance. The moderating effect of IPR protection on the relationship between technological norms and collaborative innovation performance is positive ($b = 0.162$, $p < 0.05$). We provide additional support by plotting this relationship in Fig. 2. These findings suggest that Hypothesis 6 is supported.

The moderating effect of IPR protection on the relationship between interorganizational routines and collaborative innovation performance is negative ($b = -0.149$, $p < 0.05$); thus, Hypothesis 5 was not supported. The moderating effect of IPR protection on the relationship between co-reputation and collaborative innovation performance was not significant; thus, Hypothesis 4 was not supported. These results give us additional insights into the hypothesized relationships. We discuss these findings in the Discussion section.

4.3. Robustness testing

We conducted additional analyses as robustness checks (Table 4). We included a control variable, network multiplexity, which indicates that different types of ties between two-partner firms occur together. We also ran the models adding another control variable, industrial uncertainty, and the results were robust. Additionally, we investigated the potential moderating effects of Technological Standardization (TS). The primary relationships were robust.

5. Discussion

This study investigates the following important but overlooked relationship in the relational governance literature: the impact of third-party relational governance and IPR protection on collaborative innovation performance. By integrating the relational view and innovation appropriation perspectives, we developed a conceptual model depicting the relationship

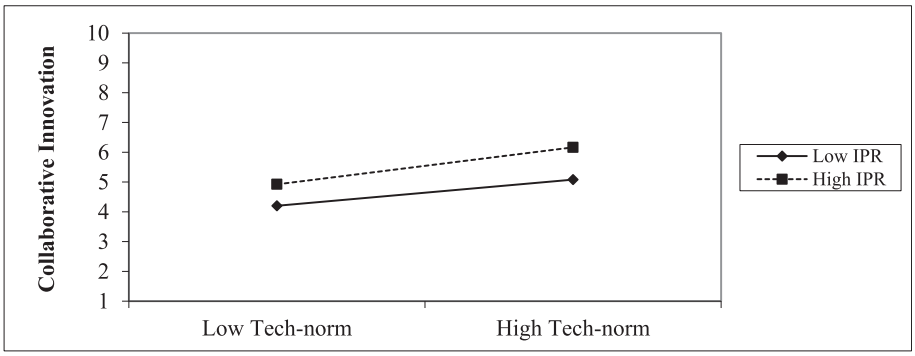

Fig. 2. The moderating effect of IPR protection on the relationship between technological norms and collaborative innovation performance.

Table 4
Robustness checks.

	Model 8 (Network multiplexity)	Model 9 (Industrial uncertainty)	Model 10 (Technological standardization)
Project time	−0.032	−0.039	−0.044
	(0.003)	(0.003)	(0.003)
Age	−0.091	−0.093	−0.073
	(0.004)	(0.004)	(0.004)
Size	−0.027	0.025	0.003
	(0.000)	(0.000)	(0.000)
Revenue	0.029	0.014	0.037
	(0.000)	(0.000)	(0.000)
R&D intensity	−0.097	−0.089	−0.073
	(0.007)	(0.007)	(0.007)
SOE	−0.090	−0.078	−0.062
	(0.283)	(0.265)	(0.259)
POE	−0.088	−0.073	−0.068
	(0.259)	(0.242)	(0.237)
Previous innovation performance	0.053	0.065	0.049
	(0.062)	(0.058)	(0.060)
Network multiplexity	0.137**		
	(0.048)		
Industrial uncertainty		0.256***	
		(0.044)	
Co-reputation	0.116*	0.115*	0.131*
	(0.056)	(0.052)	(0.063)
Interorganizational routines	0.256***	0.219***	0.257***
	(0.074)	(0.070)	(0.074)
Technological norms	0.479***	0.514***	0.372***
	(0.062)	(0.056)	(0.062)
Co-reputation × TS			0.036*
			(0.059)
Interorganizational routines × TS			0.179**
			(0.071)
Technological norms × TS			0.127*
			(0.063)
Co-reputation × IPR	−0.041	−0.025	−0.023
	(0.059)	(0.055)	(0.055)
Interorganizational routines × IPR	−0.152*	−0.173**	−0.149*
	(0.066)	(0.062)	(0.061)
Technological norms × IPR	0.176**	0.161**	0.159**
	(0.070)	(0.065)	(0.065)
ΔF	3.978**	11.696***	4.658**
R^2	0.626	0.672	0.598
Adjusted R^2	0.598	0.648	0.570
ΔR^2	0.029	0.076	0.028
DW	1.835	1.869	1.732

Notes: *p < 0.05, **p < 0.01, ***p < 0.001. The number in bracket is the standard error. SOE = State-Owned Enterprises; POE = Private-Owned Enterprises; ΔF = F Change; ΔR2 = R Square Change; DW = Durbin-Watson test.

between third-party relational governance—as measured by co-reputation, interorganizational routines, and technological norms—and collaborative innovation performance, and how IPR protection moderates the above relationship. Based on a survey of firms' collaborative innovation projects in China, we found empirical support for our hypothesized relationship between third-party relational governance and collaborative innovation performance. The findings of the moderating effect of IPR on third-party relational governance and collaborative innovation performance are mixed and we discuss this in detail below.

5.1. Theoretical implications

Our study makes several theoretical contributions. First, our study contributes to the collaborative innovation literature by advancing our understanding of collaboration governance from the perspective of third parties. Previous studies concerning collaborative innovation mainly focus on dyadic cooperation (Davis, 2016), while neglecting third parties' influence on dyadic cooperation. This study responds to the call to explore the relational governance functions of third parties beyond their structural functions (Obstfeld et al., 2014). We extend the literature by highlighting the relational governance impact of third parties on collaborative innovation performance. Third parties create a hybrid or quasi-integrated governance mode, which falls between an integrated corporate system and a disintegrated market organization (Granstrand, 1982; Williamson, 1996), which could make or break collaborative innovation. This study also responds to calls for a better understanding of the governing roles of third parties in complex collaborative innovation by separating third parties' governance actions from their network structural positions (Obstfeld et al., 2014).

Second, this study emphasizes both value creation and value appropriation in collaborative innovation. The proliferating research concerning collaborative innovation has almost entirely focused on the value creation effects of governance, while overlooking value appropriation considerations (Contractor & Woodley, 2015; Bogers et al., 2017). This study extends this realm of literature by identifying the moderating role of IPR protection.

Our results show that IPR protection has a positive moderating effect on the relationship between technological norms and collaborative innovation performance. The protection of IPR is complementary to technological norms. Strong IPR protection reinforces the impact of technological norms on collaborative innovation performance, leading us to the conclusion that with strong IPR protection in place, third-party relational governance is likely to result in better collaborative innovation performance through the mechanism of technological norms.

However, the empirical result does not support the moderating role of IPR protection in the relationship between co-reputation and collaborative innovation performance. It is possible that the effect of co-reputation is not strong enough in collaborative innovation projects in China's high-technology industry. The common values, norms, and beliefs shared across Chinese high-technology firms are not well established. The reputation-information about individual firms' behavior may not be able to flow smoothly and effectively throughout the system. Furthermore, the nature of multi-partner innovation projects involves intangible resource (e.g., tacit knowledge) mobilization and unobservable cooperation behaviors among partner firms (Davis, 2016), further reducing the effect of the co-reputation mechanism. Further studies may explore the contingency conditions affecting the co-reputation mechanism (Bitektine, 2011).

Our hypothesized moderating effect of IPR protection on the relationship between collaborative innovation performance and interorganizational routines is not supported either. In fact, our study shows that IPR protection may have a substitute interaction effect with interorganizational routines. When IPR is well protected in collaborative innovation projects, the effect of interorganizational routines is reduced. This suggests that interorganizational routines and IPR may have a substitution effect. Strong IPR protection may reduce the benefits of interorganizational routines for collaborative innovation performance, and vice versa. One possible explanation might be that strong IPR protection facilitates establishment of explicit monitoring systems and IP allocation rules among partners (Nambisan et al., 2017). Therefore, partners can coordinate complicated co-innovation processes relying on IPR protection rather than interorganizational routines. On the other hand, it also has an important implication that third-party relational governance provides an alternative solution to compensate for the weakness of an IPR regime, such as that of China. When IPR protection is greatly improved, it will compensate for the effect of interorganizational routines. This warrants a study on the limitation of relational governance (Poppo et al., 2008).

By examining the moderating effect of IPR protection, this study integrates the relational view (Dyer et al., 2008; Dyer & Singh, 1998) and innovation appropriation (Contractor & Woodley, 2015; Dyer et al., 2008; Teece, 2018) to provide a comprehensive explanation of antecedents to collaborative innovation performance. The results show that collaborative innovation may contain both complementary and substitute relations between third-party relational governance and IPR protection. These relations have not been sufficiently discussed in prior studies on collaborative innovation and innovation appropriation (Davis, 2016; Holgersson, Granstrand, & Bogers, 2018). Given the controversy surrounding China's IPR protection in recent years (Brander et al., 2017; Peng et al., 2017), this study highlights the significant role of IPR protection in influencing the governance of collaborative innovation projects.

Third, this study extends the relational governance literature by integrating the three mechanisms of third-party relational governance into one whole construct domain. The proposed theoretical model positions third-party relational governance as a key determinant of collaborative innovation performance. The three mechanisms of third-party relational governance (i.e., co-reputation, interorganizational routines, and technological norms) are holistically analyzed and synthesized in one model, which provides a comprehensive understanding of relational governance, and adds empirical evidence to the literature concerning the relationship between governance mechanisms and collaborative innovation performance.

The findings show that third-party relational governance has a positive effect on collaborative innovation performance. Specifically, co-reputation is positively associated with collaborative innovation performance. This finding suggests that the desire to build a good reputation through the endorsement of third parties promotes more collaborative innovation behavior, resulting in higher performance (Obstfeld et al., 2014). We also find that interorganizational routines facilitate collaborative innovation performance. This finding illustrates that successful collaborative innovation among different parties requires an effective coordination system established by third parties (Nambisan et al., 2017). Furthermore, our study finds a positive relationship between technological norms and collaborative innovation performance, which indicates that third parties play a very powerful role in fostering technological norms by bringing together partners with different knowledge bases (Agogué et al., 2013) to build a common platform, leading to higher collaborative innovation performance.

5.2. Managerial implications

The study also has managerial implications. Chinese firms in high-technology industries are now finding themselves operating in complicated network contexts, where knowledge is largely distributed and shared among a multiplicity of firms, and collaboration is based on emergent collective governance rather than on ex ante design and management (Jarvenpaa & Valikangas, 2016). Being competitive in such a context requires firms to place greater importance on leveraging resources embedded in innovation networks, and using collaboration beyond firm boundaries, which further requires firms to change the way they set and manage boundaries. During this cross-boundary innovation process, Chinese firms need to leverage the capabilities of third parties to achieve collaborative innovation goals. These third parties not only transmit novel information to other partners in cooperation but also create new value by engaging in symbiotic practices, including trust building, aligning partners' contributions with cooperation goals, and filling gaps in collective sense-making.

The management of intellectual property is another important factor in collaborative innovation success. Finding solutions for handling intellectual property is a major challenge in collaborative innovation. Our findings show that IPR protection could have different joint effects with different relational governance mechanisms. Firms need to carefully manage these different joint effects to maximize the benefits of collaborative innovation.

5.3. Limitations and directions for future research

The findings of our study should be interpreted in light of its limitations, which suggest opportunities for future research. First, we examine our hypotheses in the context of collaborative innovation projects in Chinese high-technology industries. Although the findings support most of our hypotheses, we should be cautious about generalizing them to other collaboration types (e.g., strategic alliances), other industries, and other countries. Future research may advance this research by considering the role of relationship-specific conditions, industry-specific conditions, and institutional contexts.

Second, while we use survey data depicting third-party relational governance and collaborative innovation performance, the use of cross-sectional data constrained our ability to interpret the dynamics between third-party relational governance and collaborative innovation performance. For example, we measure collaborative innovation performance using subjective data reported by the survey respondents. Future studies may include longitudinal designs and objective measures to uncover some of the latent and important contextual factors.

Third, while the relational governance perspective has provided important insights for the development of our theoretical framework, we are also aware that multiple partners in collaborative innovation constitute a network organization. The network theory and structural positions of different partners can be well complemented by the relational perspective. For example, researchers might explore how the network structure moderates the relationship between relational governance and collaborative innovation performance.

Conflicts of interest

The authors declare no conflicts of interest.

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Appendix

Table A1
Measurement items, construct validity and reliability.

	Items	Factor Loading	CR	AVE	Cronbach's α
Co-reputation	Provide guarantee for new partners	0.748	0.703	0.543	0.849
	Provide endorsement for our credit	0.687			
	Communicate members' reputation	0.838			
	Create common identity with partners	0.724			
Interorganizational routines	Participate in drawing out management rules and regulations	0.634	0.807	0.583	0.801
	Clarify authority and decision-making procedures	0.649			
	Organize regular meetings for members	0.723			
Technological norms	Provide technological support and services	0.762	0.912	0.564	0.885
	Search and track frontier technologies	0.802			
	Access the probability of related technology development	0.795			
	Evaluate members' technological ability	0.774			
	Breed technological norms	0.775			
	Request a technology improvement plan	0.798			
Collaborative innovation performance	This project introduced new products or services to the market.	0.754	0.819	0.531	0.893
	This project made modifications to existing products or services.	0.749			
	This project shortened the development cycle of new products or services.	0.703			
	This project shortened the marketing cycle of new products or services.	0.707			
IPR protection	We have strong control over the leakage behavior of project members.	0.758	0.904	0.61	0.866
	We have sufficient technologies to prevent any form of leakage of our project knowledge assets.	0.752			
	The innovation outcomes of our project are well protected.	0.792			
	Our project has a series of protection methods to prevent imitation by competitors.	0.740			
	The new products or services of our project are difficult for other companies to imitate directly.	0.816			
	The process and tools for innovation in our project are difficult for other companies to use directly.	0.824			
GFI = 0.91, CFI = 0.93, IFI = 0.93, RMSEA = 0.08					

Notes: CR = Construct Reliability; AVE = Average Variance Extracted; GFI = Goodness-of-Fit Index; CFI = Comparative Fit Index; IFI = Incremental Fit Index; RMSEA = Root Mean Square Error of Approximation.

References

Aggarwal, V., Siggelkow, N., & Singh, H. (2011). Governing collaborative activity: Interdependence and the impact of coordination and exploration. *Strategic Management Journal, 37*(2), 705–730.

Agogué, M., Yström, A., & Le Masson, P. (2013). Rethinking the role of intermediaries as an architect of collective exploration and creation of knowledge in open innovation. *International Journal of Innovation Management, 17*(2), 1350007.

Ahlstrom, D., Yang, X., Wang, L., & Wu, C. (2018). A global perspective of entrepreneurship and innovation in China. *Multinational Business Review, 26*(4), 302–318.

Bayne, L., Schepis, D., & Purchase, S. (2017). A framework for understanding strategic network performance: Exploring efficiency and effectiveness at the network level. *Industrial Marketing Management, 67*, 134–147.

Bitektine, A. (2011). Towards a theory of social judgments of organizations: The case of legitimacy, reputation, and status. *Academy of Management Review, 36*(1), 151–179.

Blind, K., Edler, J., Schmoch, U., Anderson, B., Howells, J., Miles, I., et al. (2003). *Patents in the service industries, final report, EC Contract No. ERBHPV2-CT-1999-06*. Brussels: European Commission.

Bogers, M. (2011). The open innovation paradox: Knowledge sharing and protection in R&D collaborations. *European Journal of Innovation Management, 14*(1), 93–117.

Bogers, M., Zobel, A. K., Afuah, A., Almirall, E., Brunswicker, S., Dahlander, L., et al. (2017). The open innovation research landscape: Established perspectives and emerging themes across different levels of analysis. *Industry & Innovation, 24*(1), 8–40.

Brander, J. A., Cui, V., & Vertinsky, I. (2017). China and intellectual property rights: A challenge to the rule of law. *Journal of International Business Studies, 48*(7), 908–921.

Burt, R. S. (1992). *Structural holes: The social structure of competition*. Cambridge, MA: Harvard University Press.

Chen, J. S., Tsou, H. T., & Ching, R. K. H. (2011). Co-production and its effects on service innovation. *Industrial Marketing Management, 40*, 1131–1346.

Contractor, F. J., & Woodley, J. A. (2015). How the alliance pie is split: Value appropriation by each partner in cross-border technology transfer alliances. *Journal of World Business, 50*(3), 535–547.

Davis, J. P. (2016). The group dynamics of interorganizational relationships: Collaborating with multiple partners in innovation ecosystems. *Administrative Science Quarterly, 61*(4), 621–661.

Davis, J. P., & Eisenhardt, K. M. (2011). Rotating leadership and collaborative innovation: Recombination processes in symbiotic relationships. *Administrative Science Quarterly, 56*(2), 159–201.

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

Dyer, J. H., Singh, H., & Hesterly, W. S. (2018). The relational view revisited: A dynamic perspective on value creation and value capture. *Strategic Management Journal, 39*(12), 3140–3162.
Dyer, J. H., Singh, H., & Kale, P. (2008). Splitting the pie: Rent distribution in alliances and networks. *Managerial and Decision Economics, 29*(2/3), 137–148.
Ferguson, R. J., Paulin, M., & Bergeron, J. (2005). Contractual governance, relational governance, and the performance of interfirm service exchanges: The influence of boundary-spanner closeness. *Journal of the Academy of Marketing Science, 33*(2), 217–234.
Fichter, K., & Beucker, S. (2012). Innovation communities: Teamworking of key persons-a success factor in radical innovation. *Springer Science & Business Media*, 84–85.
Fornell, C. R., & Lacker, D. F. (1981). Two structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*, 39–50.
Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology, 91*(3), 481–510.
Granstrand, O. (1982). *Technology, management and markets: An investigation of R&D and innovation in industrial organizations. External organization*.
Heide, J. B., & John, G. (1992). Do norms matter in marketing relationships? *Journal of Marketing*, 32–44.
Helfat, C. E., & Raubitschek, R. S. (2018). Dynamic and integrative capabilities for profiting from innovation in digital platform-based ecosystems. *Research Policy, 47*(8), 1391–1399.
Holgersson, M., Granstrand, O., & Bogers, M. (2018). The evolution of intellectual property strategy in innovation ecosystems: Uncovering complementary and substitute appropriability regimes. *Long Range Planning, 51*(2), 303–319.
Howells, J. (2006). Intermediation and the role of intermediaries in innovation. *Research Policy, 35*(5), 715–728.
Hurmelinna-Laukkanen, P., Olander, H., Blomqvist, K., & Panfilii, V. (2012). Orchestrating R&D networks: Absorptive capacity, network stability, and innovation appropriability. *European Management Journal, 30*(6), 552–563.
Hurmelinna-Laukkanen, P., & Puumalainen, K. (2007). Nature and dynamics of appropriability: Strategies for appropriating returns on innovation. *R & D Management, 37*(2), 95–112.
Jarvenpaa, S. L., & Valikangas, L. (2016). From governance void to interactive governing behaviors in new research networks. *Academy of Management Discoveries, 2*(3), 226–146.
Jones, C., Hesterly, W. S., & Borgatti, S. P. (1997). A general theory of network governance: Exchange conditions and social mechanisms. *Academy of Management Review, 22*(4), 911–945.
Klerkx, L., & Aarts, N. (2013). The interaction of multiple champions in orchestrating innovation networks: Conflicts and complementarities. *Technovation, 33*(6/7), 193–210.
Krohn, W., Layton, E. T., Jr., & Weingart, P. (2012). *The dynamics of science and technology: Social values, technical norms and scientific criteria in the development of knowledge* (Vol. 2). Springer Science & Business Media.
Lichtenthaler, U. (2010). Intellectual property and open innovation: An empirical study. *International Journal of Technology Management, 52*(3–4), 372–391.
Macneil, I. R. (1980). Power, contract, and the economic model. *Journal of Economic Issues, 14*(4), 909–923.
Manzini, R., & Lazzarotti, V. (2016). Intellectual property protection mechanisms in collaborative new product development. *R & D Management, 46*(S2), 579–595.
Markham, S. K., Ward, S. J., Aiman-Smith, L., & Kingon, A. I. (2010). The valley of death as context for role theory in product innovation. *Journal of Product Innovation Management, 27*(3), 402–417.
Miozzo, M., Desyllas, P., Lee, H. F., & Miles, I. (2016). Innovation collaboration and appropriability by knowledge-intensive business services firms. *Research Policy, 45*(7), 1337–1351.
Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2017). Digital innovation management: Reinventing innovation management research in a digital world. *MIS Quarterly, 41*(1).
Nambisan, S., & Sawhney, M. (2011). Orchestration processes in network-centric innovation: Evidence from the field. *Academy of Management Perspectives, 25*(3), 40–57.
O'Mahony, S., & Ferraro, F. (2007). The emergence of governance in an open source community. *Academy of Management Journal, 50*(5), 1079–1106.
Obstfeld, D. (2005). Social networks, the tertius iungens orientation, and involvement in innovation. *Administrative Science Quarterly, 50*(1), 100–130.
Obstfeld, D., Borgatti, S. P., & Davis, J. (2014). Brokerage as a process: Decoupling third party action from social network structure. *Contemporary Perspectives on Organizational Social Networks, 40*, 135–159.
Peng, M. W., Ahlstrom, D., Carraher, S. M., & Shi, W. (2017). An institution-based view of global IPR history. *Journal of International Business Studies, 48*, 893–907.
Perkmann, M., & Schildt, H. (2015). Open data partnerships between firms and universities: The role of boundary organizations. *Research Policy, 44*(5), 1133–1143.
Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879.
Poppo, L., & Zenger, T. (2002). Do formal contracts and relational governance function as substitutes or complements? *Strategic Management Journal, 23*(8), 707–725.
Poppo, L., Zhou, K. Z., & Zenger, T. R. (2008). Examining the conditional limits of relational governance: Specialized assets, performance ambiguity, and long-standing ties. *Journal of Management Studies, 45*(7), 1195–1216.
Rindova, V. P., Williamson, I. O., Petkova, A. P., & Sever, J. M. (2005). Being good or being known: An empirical examination of the dimensions, antecedents, and consequences of organizational reputation. *Academy of Management Journal, 48*(6), 1033–1049.
Ritala, P., Agouridas, V., Assimakopoulos, D., & Gies, O. (2013). Value creation and capture mechanisms in innovation ecosystems: A comparative case study. *International Journal of Technology Management, 63*(3–4), 244–267.
Sawang, S., Zhou, Y., & Yang, X. (2017). Does institutional context matter in building innovation capability? International journal of technological learning. *Innovation and Development, 9*(2), 153–168.
Sørensen, E., & Torfing, J. (2017). Metagoverning collaborative innovation in governance networks. *The American Review of Public Administration, 47*(7), 826–839.
Stuart, T. E., Hoang, H., & Hybels, R. C. (1999). Interorganizational endorsements and the performance of entrepreneurial ventures. *Administrative Science Quarterly, 44*(2), 315–349.
Su, Y. S., Zheng, Z. X., & Chen, J. (2018). A multi-platform collaboration innovation ecosystem: The case of China. *Management Decision, 56*(1), 125–142.
Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal, 17*(S2), 27–43.
Teece, D. J. (2006). Reflections on "profiting from innovation". *Research Policy, 35*(8), 1131–1146.
Teece, D. J. (2018). Profiting from innovation in the digital economy: Enabling technologies, standards, and licensing models in the wireless world. *Research Policy, 47*(8), 1367–1387.
Teece, D. J., & Pisano, G. P. (2007). How to capture value from innovation: Shaping intellectual property and industry architecture. *California Management Review, 50*(1), 278–296.
Wang, Y. Q. (2016). China needs to push collaborative innovation. *China Daily*. http://www.chinadaily.com.cn/china/2016-06/17/content_25751200.htm. (Accessed 6 November 2017).
Williamson, O. E. (1996). Transaction cost economics and the Carnegie connection. *Journal of Economic Behavior & Organization, 31*(2), 149–155.
Zaggl, M. (2017). Manipulation of explicit reputation in innovation and knowledge exchange communities: The example of referencing in science. *Research Policy, 46*(2), 970–983.

Zaheer, A., & Venkatraman, N. (1995). Relational governance as an interorganizational strategy: An empirical test of the role of trust in economic exchange. *Strategic Mmanagement Journal, 16*(5), 373–392.
Zahra, S. A., Yavuz, R. I., & Ucbasaran, D. (2006). How much do you trust me? The dark side of relational trust in new business creation in established companies. *Entrepreneurship: Theory and Practice, 30*(4), 541–559.
Zollo, M., Reuer, J. J., & Singh, H. (2002). Interorganizational routines and performance in strategic alliances. *Organization Science, 13*(6), 701–713.