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# Efficacy of supply chain relationships – differences in performance appraisals between buyers and suppliers

Chen Qian<sup>1</sup> · Paul A. Dion<sup>2</sup> · Ralf Wagner<sup>3</sup> · Stefan Seuring<sup>1</sup>

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## Abstract

This paper examines the efficacy of three supply chain relationship factors: trust, commitment, and relationship specific investment (RSI) in affecting firms' cooperation, innovation and financial performance, comparing buyers' and suppliers' perspectives. A questionnaire survey was conducted in mainland China. Two independent samples with 101 and 108 responses respectively from the Chinese business buyers and suppliers were collected by visiting nine large annual exhibitions. Both samples involved buyer–supplier business relationships across three business markets: textiles, food, and consumer electronics. The data was analysed using structural equation modelling and a two-groups invariance test. The results indicate that the efficacies of trust, commitment, and RSI influencing buyers' and suppliers' performance are different. The paths from the relationship factors leading to performance form patterns that differ between buyers and suppliers in the Chinese business context. While trust and RSI are the direct antecedents of buyers' cooperation performance, commitment is the immediate precursor of suppliers' cooperation performance. Trust and commitment lead to buyer's innovation performance directly, while RSI is a direct driver of supplier' innovation performance. In addition, RSI is not a significant factor for buyers' financial performance, whereas it will generate financial return for suppliers. Based on these findings, we provide differentiated relationship management suggestions to managers of buying and supplying firms for helping them improve performance in the Chinese business market in particular. For example, trust and commitment are more important relationship factors than RSI for buying firms, while RSI is as significant as trust and commitment for supplying firms.

**Keywords** Supply chain relationship · Relationship quality · Buyer performance · Supplier performance · Buyer-supplier difference

## 1 Introduction

Increasing performance is one of the primary objectives for companies building high-quality relationships with supply chain (SC) partners. “As firms strive to develop a sustainable competitive advantage, the relationships formed among supply chain parties become a critical consideration” (Nyaga and Whipple 2011, p. 345). Accordingly, scholars have adopted the concept of relationship quality in the SC research to analyze how the quality of the relationships built and developed by firms with SC partners affects their performance, from the business buyers' and/or suppliers' perspectives (e.g., Hüseyinoğlu et al. 2020; Li 2021; Yang et al. 2021; Zeng et al. 2013).

While a solid number of SC relationship quality studies have suggested and confirmed that an overall SC relationship quality has a positive impact on the collaborating partners' performance, scholarly discussions on which relationship

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factors are more effective with specific values for performance are limited. On the one side, many studies analyzed the aggregate effect of relationship quality, which is composed of diverse and interdependent relationship factors using a second-order model (Qian et al. 2021b). For example, Chu and Wang (2012) found that relationship quality measured by trust, commitment, and satisfaction has a positive impact on buyers' financial performance. Nyaga and Whipple (2011) observed that relationship quality measured by trust, commitment, satisfaction and relationship specific investment (RSI) affects buyers' and suppliers' operational performance positively. Li (2021) confirmed that an overall SC relationship quality positively effects firms' innovation performance. However, in these studies, the efficacy of the individual relationship factors such as trust, commitment, satisfaction, and RSI is vague. On the other side, some scholars focused on only one relationship factor in a study (e.g., Chiang et al. 2018; Patrucco et al. 2020; Huang and Huang 2019). Do so, scholars limit the ability of the relationship quality studies to clarify the efficacy of the various relationship factors influencing performance. In order to support managers in deepening their understanding of the key relational drivers of firm performance and thus establish the effective relationships with their customers and suppliers to achieve the desired outcomes, and enhance returns on firms' relationship investment, there is a need of research that examines the individual role and efficacy of various relationship factors affecting performance.

Notably, a majority of the studies challenging SC relationships and performance has adopted either the buyers' or the suppliers' perspective (e.g., Barnes et al. 2015; Gounaris and Tzempelikos 2014). Only a few studies have considered and compared both perspectives, which has been considered a research gap in the area (Qian et al. 2021b). Questions such as whether buyers and suppliers are able to achieve mutual benefits through developing and maintaining high-quality relationships has been proposed, as sometimes there was feeling of inequity in a relationship, even though both the buyer and supplier benefited from the relationship (Nyaga et al. 2010). The few studies that compared buyer supplier perspectives on SC relationships did not show definitive conclusion on this issue. While some scholars found that buyers and suppliers have perspectives that are generally more similar than they are different (Nyaga et al. 2010), other researchers supported that buyers and suppliers benefit in divergent ways in collaboration relationships (e.g., Ambrose et al. 2010; Kim et al. 2010; Sweeney and Webb 2002). They provided empirical evidence that buyers' and suppliers' perspectives differ in regard to the facilitators and barriers to buyer–supplier cooperation (Kim et al. 2010), the antecedents of relationship success (Ambrose et al. 2010), and the impact of collaborating relationships on firms' performance (Nyaga and Whipple 2011). In order to clarify how buyers and suppliers can achieve mutual benefits in a

SC relationship, more research that examines the similarities and differences of buyer supplier perspectives on relationship outcomes for example firm performance by comparing data from buyers and suppliers is needed.

This paper aims to fill in the research gap elaborated above by examining the efficacy of SC relationship factors affecting performance, comparing buyers' and suppliers' perspectives. Three relationship factors: trust, commitment, and RSI are studied, as they have been identified the prime and direct drivers of interfirm relationship performance (Palmatier et al. 2007). Based on this objective, two research questions are to be answered: (1) what role do trust, commitment, and RSI play in influencing performance on the level of the collaborating SC partners, and (2) whether buyers' and suppliers' perspectives differ. The novelty of the paper is twofold. Firstly, differs from many previous studies, this paper abandons the second-order relationship quality concept and examines the potential for the individual underlying relationship factors: trust, commitment, and RSI to contribute to firms' cooperation, innovation and financial performance simultaneously. By this means, the efficacy of the different relationship factors affecting performance will be identified and compared, which has rather limitedly been addressed in existing literature by far. Secondly, by comparing buyer supplier perspectives, this paper provides further insight into the differences in relationship performance appraisals between buyers and suppliers. The empirical evidence of the study points to that the paths from the relationship factors leading to performance form patterns that differ between buyers and suppliers. This adds to the limited SC relationship literature that compares buyer supplier perspectives.

In order to achieve the research objective, we will firstly develop a general model including the three SC relationship factors: trust, commitment, and RSI and the three types of firm performance: cooperation, innovation and financial performance. The model will be tested using two independent samples—a sample from the buyers' perspective and a sample from the suppliers' perspective separately. The unit of analysis is a firm's perception of its relationship with a supplier or a customer and its performance resulting from this relationship. After testing the buyer and supplier models separately, we will conduct a buyer–supplier-two-groups invariance test and compare the buyer and supplier results, in order to identify whether the model's paths are different for buyers and suppliers.

The remainder of this paper is structured as follows: in Sect. 2, the theoretical base and conceptual background for development of a general model of direct SC relationship performance drivers is provided. Then, the scholarly discussions on the differences between buyers' and suppliers' perspectives in SC relationships are elaborated. Based on that, the hypotheses are developed. Subsequently, the research methodology applied herein is explained. We then present

the data analysis and results. In Sect. 5, the results are discussed, and the managerial implications are provided. In addition, we describe the limitations of this paper and suggest the directions for future research. Finally, we conclude with the contributions and major findings of this paper.

## 2 Conceptual background and hypotheses development

### 2.1 Direct SC relationship performance drivers

Scholars have adopted various theoretical perspectives such as social exchange theory, transaction cost economics, resource dependence theory, and resource bases theory to explain the relationships between firms' performance and their relationships with SC partners (e.g., Palmatier et al. 2007; Fynes et al. 2008). Accordingly, several diverse and interdependent relationship factors have been used to evaluate buyers' or suppliers' perceptions of SC relationship quality (Qian et al. 2021a). Some scholars have tried to compare the relative efficacy of the different perspectives and the different factors for driving performance. A seminal work was conducted by Palmatier et al. (2007), who tested five models comparing the theoretical perspectives that are predominately cited in inter-organizational marketing research: (1) commitment-trust, (2) dependence, (3) transaction cost economics, (4) relational norms, and (5) resource based view alongside relational view. Each model includes trust, commitment, dependence, RSI, opportunistic behaviors, relational norms, and communication as the direct or indirect performance drivers. The results show that commitment-trust and RSI play parallel and equally important roles and are the immediate antecedents of performance, while the other factors such as dependence, opportunistic behaviors, relational norms, and communication affect performance indirectly and are fully mediated by commitment, trust, and RSI. These results are in line with the resource based view and the relational view, which postulates that superior performance occurs when relationship partners invest idiosyncratic assets, resources, and capabilities into a relationship (RSI) and build an effective governance structure (commitment and trust) to the relationship (Palmatier et al. 2007).

Based on Palmatier et al.'s (2007) findings, this paper considers the three direct relationship performance drivers: trust, commitment, and RSI, which are the prime determinants of firm and interfirm competitive advantages in the theoretical framework of resource-based and relational view. The resource-based view explains that a firm can achieve a competitive advantage "when it is able to create value [...] derived from strategic resources that a firm develops that are valuable, scarce, and imperfectly imitable" (Nyaga and Whipple 2011, 346). The relational

view extends this from an individual firm unit of analysis to an interfirm level and postulates that strategic resources are not solely developed through a single firm but may be achieved by building and maintaining high quality interfirm relationships (Dyer and Singh 1998). Notably, the relational view integrates the relational and transactional governance mechanism into interfirm relationship management. While commitment and trust provide the relational governance, RSI explains the transactional governance, which is considered the complement of the relational governance (Nyaga et al. 2013; Brito and Miguel 2017).

Trust and commitment are the two central elements for establishing, developing, and maintaining successful relational exchanges in the commitment-trust theory proposed already by Morgan and Hunt (1994). They have been considered the crucial factors that influence relationship parties' performance and relational behaviors. Trust is described "as existing when one party has confidence in an exchange partner's reliability and integrity" (Morgan and Hunt 1994, p. 23) and incorporates two key components—credibility and benevolence (e.g., Fang et al. 2011). "Trust in a partner's credibility refers to the belief that the partner stands by their word, fulfils promised role obligations, and is sincere. Benevolence refers to the belief that the partner is interested in the firm's welfare and will not take unexpected actions that will negatively affect the firm" (Chang et al. 2012b, p. 858).

Commitment was conceptualized as "an enduring desire to maintain a valued relationship" (Moorman et al. 1992, p. 316) or an organization's belief "that an ongoing relationship with another is so important as to warrant maximum efforts at maintaining it" (Morgan and Hunt 1994, p. 23). Commitment will result in "the desire to develop a stable relationship, the willingness to make short-term sacrifices to maintain the relationship, and the confidence in the stability of the relationship" (e.g., Chang et al. 2012a, p. 1049). Many scholars characterized a committed relationship by the relationship partner's intention to maintain long-term relationships, which implies the partner looking forward to achieving long-term benefits (e.g., Chang et al. 2012a; Chu and Wang 2012; Liu et al. 2010). Scholars have generally considered that trust is a primary determining factor of relationship commitment (e.g., Morgan and Hunt 1994; Ulaga and Eggert 2006; Nyaga et al. 2010; Wu et al. 2015). A relationship without trust is not worth commitment and does not deserve the firm's effort to maintain it.

RSI is a central governance mechanism in transaction cost economics. It refers to a relationship party's dedicated investment in assets that are tailored for use between the two parties in a specific relationship. These assets incorporate human resources, equipment, expertise, capacity, technology, and supporting systems (Nyaga and Whipple 2011). The relational view considers interfirm relation-specific assets an important determinant of interorganizational competitive

advantage. Dyer and Singh (1998) noted that a firm can achieve competitive advantages “by creating assets that are specialized in conjunction with the assets of an alliance partner” (p. 662) and productivity would be gained when firms are willing to make RSI. Palmatier et al. (2007) reinforced this notion by suggesting that RSI has an equally strong and independent direct effect on performance as commitment and trust. Because investments in a specific relationship are not re-deployable in other relationships, it signals the relationship parties’ intention and the need to safeguard investments and thus reduces opportunism. With fewer opportunism, the relationships would become more efficient, cooperative and persistent, which contributes to improved performance.

## 2.2 SC relationship performance

This paper analyses three types of SC relationship performance: cooperation, innovation and financial performance, which contribute to the collaborating firms’ relational, operational, and financial performance respectively (Qian et al. 2021b). Firms’ willingness and activities of cooperation with SC partners describes firms’ performance at the relational level. Scholars considered cooperation in joint planning, process developing and quality improvement the important activities for firms to work on jointly with SC partners (e.g., Fynes et al 2008; Su et al. 2008; Nyaga et al. 2013). Trust, commitment and RSI are the determinants of firms’ cooperation performance. On the one side, cooperation activities are usually associated with dedicated personnel and/or equipment investment in the relationship, which implies that RSI is the antecedent of firms’ cooperation performance (e.g., Nyaga et al. 2010). On the other side, the investment may cause massive costs and could not be paid back in the short-term. If the firm is not committed and long-term oriented to the relationship, it is not likely to invest in the cooperation, which may lead to lower short-term profits. Meanwhile, if a firm does not trust in its SC partner, it will not invest in the cooperation, because the opportunism and uncertainty are high.

Innovation addresses the operational level of firm performance (Qian et al. 2021b). It was defined as the extent to which a firm “generates, develops, and implements an idea, practice, product, process, or administrative systems, perceived to be new by the relevant unit of adoption” (Chang et al. 2012a, p. 1048). Firms’ innovation performance has been considered an essential source for achieving firms’ sustainable competitive advantage in a dynamic and competitive environment. Trust in and commitment to the SC partner enables building a fine working atmosphere and substantially increases efficiency of information and resources exchange with the partner, which facilitates the firm’s knowledge and technological development (Chang

et al. 2012a). Innovation is usually based on substantial investment in personnel, expertise, equipment, and supporting systems and can be driven by investment in specific business relationship (Munksgaard et al. 2014).

Financial performance represents firm performance in terms of sales, sales growth, profit, return on investment, and cost, etc. A review of the previous SC relationship literature shows that many scholars used the financial performance metrics to assess the consequences of the level of buyer–supplier relationships (Qian et al. 2021b). The relational view postulates that a firm’s economic rents could be developed through building valuable, dedicated, and imperfectly imitable relationships with its SC partners, which are characterized by relationship parties’ mutual trust, commitment, and investment dedicated to the specific relationships (Dyer and Singh 1998).

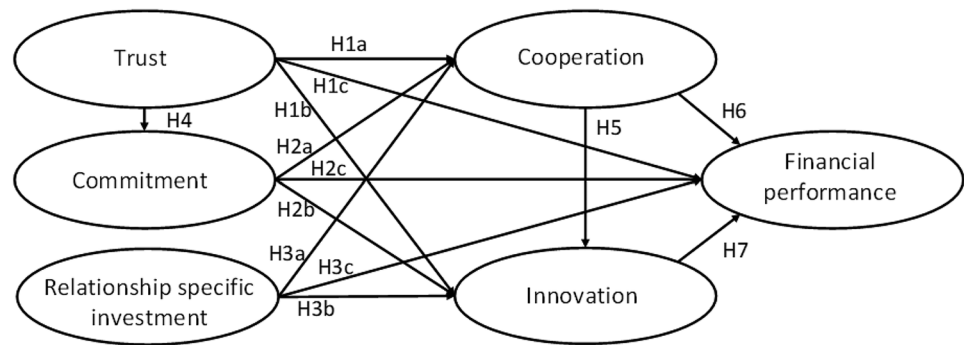
Furthermore, the relational view generally presumes that firms can achieve a competitive advantage from cooperation with SC partners to acquire valuable resources, which cannot be acquired or possessed or owned by an individual firm in isolation (Dyer and Singh 1998). This implies that economic rents could be developed through interfirm cooperation, if this generates higher efficiencies and thus higher financial return. Barnes et al. (2015) noted that “cooperative actions among exchange parties enable the resulting outcome to exceed that of a firm acting solely in its own interest” (p. 30) and “this is the key reason why cooperation leads to improved financial performance” (Barnes et al. 2011, p. 512).

In addition, through cooperation in joint planning, process development, and quality improvement, collaborating firms are likely to share new ideas for process design, management expertise, or business and market trends, which would be a driver of firms’ innovation (Kim et al. 2011). Based on the resource-based view, a firm’s innovation performance can be seen as a highly valued internal strategic resource, from which the firm would create value such as differentiation and this enables a market advantage by providing innovative products, or creating greater efficiencies through improved operations. This value may differ from those of the competing firms and cannot be easily imitated or substituted by them. Thus, it could lead to a competitive advantage and improved financial performance for the firm (Nyaga and Whipple 2011).

Considering trust, commitment, and RSI the direct drivers of firms’ cooperation, innovation, and financial performance resulting from the particular SC relationship, we proposed a general model illustrated in Fig. 1. This model presents the relationships between a firm’s perception of the relationship with a SC partner and its performance resulting from this relationship. Based on this model, this paper aims to differentiate buyers’ and suppliers’ perspectives by predicting whether the relationship factors will influence performance for buyers and



**Fig. 1** A model of direct SC relationship performance drivers



suppliers differently. More specifically, we will examine the impact of trust, commitment, and RSI on cooperation, innovation, and financial performance matching buyers' and suppliers' perspectives. In the following section, the scholarly discussions that compared buyers' and suppliers' perspectives on SC relationship performance are elaborated. Based on this, we will develop the hypotheses.

### 2.3 Perspectives of buyers and suppliers

Regarding the question whether buyers and suppliers have different perspectives on relationship performance, it is difficult to draw conclusion by comparing the separate bodies of work on buyers and suppliers, due to the lack of consistent concepts or models (Ambrose et al. 2010). Results from the few studies that considered both perspectives offer no conclusive answer. While some scholars concluded that buyers' and suppliers' perspectives are more similar than they are different (Nyaga et al. 2010), other researchers supported that while buyers and suppliers engage in collaboration relationships for mutual benefits, each party benefit in divergent ways (e.g., Ambrose et al. 2010; Kim et al. 2010; Sweeney and Webb 2002).

Some studies highlighted that trust is more important for buyers than suppliers in SC relationships. For example, Judith et al. (2000) pointed out that trust was considered the most important factor in alliance success for buyers but not for suppliers. Kim et al. (2010) noted that trust is a decisive determinant of cooperation for buyers but not for suppliers. Ambrose et al. (2010) found that the suppliers' credibility is a crucial determinant of operational performance such as order accuracy, on-time delivery, and productivity for buyers. Nyaga et al.'s (2010) study also showed that the effect of trust on commitment is significantly higher for buyers than for suppliers. Consolidating, the studies above reveal that buyers appear to be more willing to commit to and cooperate with a supplier that they trust to provide superior products and services. To work with a trustworthy supplier is decisive for buyers to achieve superior performance and success. For suppliers, even when they have a trustworthy relationship with a buyer, they realize that the

relationship is about business "pay off" in the end and the buyer may switch to an alternative, if its expectation could not be met (Nyaga et al. 2010). Therefore, the effect of trust on commitment, cooperation, and performance is lower for suppliers than for buyers. Some scholars explained these differences between the buyers' and the suppliers' perspectives by the dependence asymmetry in the supply channel in which dependence asymmetry creates a power imbalance and buyers enjoy relative power over their suppliers (e.g., Kim et al. 2010; Son et al. 2016). Suppliers' trust in the buyer plays a relatively weaker role in their cooperation with or role performance towards the buyer, when the buyer exercises coercive power.

In respect of the role of commitment in affecting performance, Nyaga et al.'s (2010) study also provides evidence for the buyer supplier difference. By comparing two independent studies using a buyers' sample and a suppliers' sample, they found that buyers' commitment to the supplier relationship directly lead to buyers' operational performance; however, suppliers' commitment to the buyer relationship has no directly significant impact on suppliers' operational performance. Additionally, the invariance test across the buyers' and suppliers' samples showed that the impact of commitment on operational performance is significantly higher for buyers than for suppliers. Nyaga et al. (2010) explained that suppliers' commitment to a buyer relationship may not guarantee improved performance, if buyers regularly require contract revisions depending on changing market trends and these are not favorable to the supplier. We may use the equity theory (Adams 1965) to explain this buyer supplier difference. When the supplier perceives the ratio of its benefits from the relationship to its inputs into the relationship is less than the corresponding ratio of its customer, a perceptual inequity exists. It may impact the relationship outcomes for example reduce the supplier's performance (Nyaga et al. 2010). This was also confirmed by Wang et al. (2022), who found that the perception of fairness asymmetry leads to a decrease in supplier performance over time.

Further, there is evidence for that buyers' and suppliers' perspectives differ on the impact of the overall relationship

quality on performance. Nyaga and Whipple (2011) compared two buyer samples and two supplier samples and found that the impact of relationship quality composed of trust, commitment, satisfaction, and RSI on satisfaction with strategic performance is significantly higher for supplier-collaboration sample than for buyer-collaboration sample. In addition, the impact of operational performance on satisfaction with strategic performance is significantly lower for supplier samples than for buyer samples.

The scholarly discussions on the buyer supplier similarities and differences in SC relationships and their findings highlight that the comparison of buyer supplier perspectives has important significance. Based on the evidence provided in prior literature, we would suggest that overall, buyers' and suppliers' perspectives differ on the impact of SC relationships on performance. Regarding the general model proposed above, we thereby differentiate buyers' and suppliers' perspectives:

**H1a-c** The influence of trust on (a) cooperation, (b) innovation and (c) financial performance for buyers differs from that for suppliers.

**H2a-c** The influence of commitment on (a) cooperation, (b) innovation and (c) financial performance for buyers differs from that for suppliers.

**H3a-c** The influence of RSI on (a) cooperation, (b) innovation and (c) financial performance for buyers differs from that for suppliers.

**H4** The influence of trust on commitment for buyers differs that for suppliers.

**H5** The influence of cooperation on innovation for buyers differs that for suppliers.

**H6** The influence of cooperation on financial performance for buyers differs that for suppliers.

**H7** The influence of innovation on financial performance for buyers differs that for suppliers.

### 3 Research method

We conducted a questionnaire survey in mainland China for testing the model and hypotheses. We selected Mainland China as the research context, due to the relevance of China in global economy and the special significance of relationships (guanxi) for business success in the high-content Chinese culture. Scholars have stressed the importance of research that improved the understanding of how relationships formed

among SC partners work in China (e.g., Barnes et al. 2011). While many contributions to managing SC relationships are developed by considering the Chinese context (e.g. Barnes et al. 2011, 2015; Chu and Wang 2012; Fang et al. 2011; Huang et al. 2016), none of them has compared buyers' and suppliers' perspectives. Our empirical paper fills in this gap by collecting data from surveys distributed across two independent samples: a sample of buying firms and a sample of supplying firms. Both samples involve buyer–supplier business relationships across three business markets: textiles, food, and consumer electronics in mainland China. Thus, we adopted consumer goods SC in mainland China as the research context. Multiple sectors were selected for increasing the possibility of generalizing findings. The unit of analysis is a firm's perception of its relationship with a supplier or a customer and its performance resulting from this relationship. To test the hypotheses, we will test the proposed model (see Fig. 1) using the buyers sample and the suppliers sample separately as well as through the invariance tests across the two groups.

#### 3.1 Survey instrument and measurement scales

We initially developed a questionnaire based on existing measures for the research variables. We employed and adapted the measurement items from previous studies. Based on the research aims and research design, we chose measures that are valid from both the buyers' and suppliers' perspectives and have been empirically validated in the Chinese context if applicable. All measurements are based on a reflective operationalization of the constructs, which means that the measures represent overall concepts. To assess trust, a slightly modified Barnes et al.'s (2015) scale originally adapted from Doney and Cannon (1997) was used. Commitment was measured by adapting a combined scale from Morgan and Hunt (1994) and Jiang et al. (2016). The measures for RSI was sourced from Nyaga and Whipple (2011). Cooperation performance was operationalized applying Fynes et al.'s (2008) scale, which has also been validated in the Chinese context by Su et al. (2008) and Song et al. (2012). To measure the firm's innovation performance, a slightly modified Gounaris and Tzempelikos's (2014) scale was employed. Financial performance was measured applying Barnes et al. (2015)'s scale, as it has been validated in the Chinese context. Due to the difficulty in obtaining objective financial data of the firms, we used perceptual measures to assess firms' financial performance in terms of increase in profitability and significance in cost savings by relating it to the performance of their competitors.

To control possible confounding effects, we added two control variables: firm size and relationship length to the analysis. Firm size can have an effect on firm performance, because large firms have more human and capital resources, therefore are more likely to achieve high performance than

smaller firms (Lai et al. 2013; Wu et al. 2015). Relationship length is expected to affect firm performance, because scholars found that the longer the relationship is between working partners, the better the performance of relationship partners will be (e.g., Terawatanavong et al. 2011). We measured firm size by asking the respondents about the number of the full-time employees in a firm (e.g., Wu et al. 2015). Respondents chose one of the five levels ranging from “less than 100” to “5000 or more”, which corresponds to small to large firm size respectively. Relationship length was measured by the number of years of a relationship that a firm has with its SC partner (e.g., Chu and Wang 2012). The respondent chose one of the five categories ranging from “less than one year” to “20 years and more”.

The initial measures were further evaluated through a focus group discussion involving four academics in the area of marketing and supply chain management. Based on this, we developed the questionnaire in English, and then translated it into Chinese. In accord with the studies of Barnes et al. (2015) and Huang et al. (2016), we verified the content of the questionnaire using a back translation. By comparing the back-translated English questionnaire and the original one, we made some rewordings to the Chinese questionnaire in order to improve the accuracy of the translation. Afterwards, we conducted six pilot tests through interviews with six Chinese managers in the target companies. Based on their feedbacks, we refined the wording of the items. The modified content was further discussed with these managers until the ambiguities were eliminated. Through inspection by the academic experts and the managerial pretesting, the content validity of the questionnaire was ensured.

The questionnaire requests the key respondent to consider a significant relationship with a supplying or a buying firm in his/her firm's SC for which he or she is responsible. The respondent chose to answer the questionnaire as a buyer or supplier according to his/her position in the firm and the business he/she is responsible for. With respect to the business relationship considered, the respondent is requested to evaluate the degree of his/her agreement with a given statement for each scale measuring the constructs on a seven-point Likert scale ranging from “strongly disagree” (1) to “strongly agree” (7).

The validity and reliability of the measurement model for both the buyer and supplier data sets were assessed by conducting confirmatory factor analyses, Cronbach alpha, extracted variance and composite reliability. We used SPSS Amos 26 software for testing the measurement model. In order to ensure the best fitting model, we re-specified the model by eliminating under-performing measures. The analysis and results of the measurement model are explained in Sect. 4.1 in detail.

### 3.2 Data gathering

Questionnaires were distributed by visiting nine large annual exhibitions in the three business sectors, which were held in Shanghai in March and April of 2017. The target respondents were the managers or representatives of the companies that participated in the exhibitions as the exhibitors. The companies were randomly selected and invited to participate in the survey. We employed a two-step-approach to collect data from a company. The first step was face-to-face communication between the researchers and the potential respondents of each randomly selected company. The objective and method of the survey were briefly explained to the representatives of this company. The representatives were free to choose whether they participated or not. Then, the key informant for each company, who was able to answer the questionnaire accurately, was chosen from those representatives. This informant was identified by the top manager's assignment, the peer recommendation, or the self-nomination. The competency of the informant is reflected in the questionnaire. We asked about the informant's position in the firm and his/her personnel experience with respect to the relationship surveyed. Accordingly, we relied on a single respondent in each firm, as he/she was regarded as the most appropriate person in the firm, who could answer the questionnaire in the exhibition. Afterwards, this key informant was requested to read through the questionnaire. In case of unclear questions, the issues were explained by the researcher. By means of face-to-face communication, we sought to (1) increase the number of the participants by motivating the exhibitors to contribute to the survey; (2) identify the right informants who had the relevant knowledge and experience in the issue of interest; (3) motivate the informant to respond to the questionnaire accurately by explaining any ambiguities (MacKenzie and Podsakoff 2012). We emphasized the relevance of their personnel opinion by explaining to respondents that they need to answer the questions based on their personnel perception. Moreover, we guaranteed anonymity for all respondents. After the face-to-face communication, in the second step, the identified respondent in each company was asked to fill out the questionnaire. The researchers picked up the completed questionnaires later in the exhibition.

We distributed a total of 296 questionnaires, of which 238 responses were successfully returned. Eliminating 29 incomplete responses, 209 complete responses were applied to the final analysis. Among those, 101 questionnaires were answered from the buying firms' perspective, while 108 respondents answered the questionnaire as a supplier. This achieved a response rate of 70.6%. We considered that the response rate achieved in this study benefited from the face-to-face communication in the data gathering. In comparison to the traditional approaches such as the postal, e-mail or online survey, the approach used in this paper showed the advantages such as increased motivation and decreased common method bias.



**Table 1** Respondent demographics

Construct and indicators	Indicators standardized loadings (t-value)	
	Buyer (N = 101)	Supplier (N = 108)
<b>Industry</b>		
– Textile	47.5	43.5
– Food	31.7	40.7
– Consumer electronics	20.8	15.7
<b>Ownership</b>		
– Chinese state-owned company	12.9	13
– Chinese private company	71.3	72.2
– Joint venture	10.9	10.2
– Wholly foreign company	6.9	5.9
<b>Main business</b>		
– Manufacturing	69.3	82.4
– Retail	10.9	8.3
– Wholesale	13.9	14.8
– Import/export	35.6	25
– Others	4	1.9
<b>Number of employees</b>		
– < 100	38.6	18.5
– 100–499	42.6	44.4
– 500–999	5.9	13.9
– 1,000–4,900	11.9	11.1
– > = 5,000	1	12
<b>Annual turnover (million RMB yuan)</b>		
– < 5	9.9	1.9
– 5–10	3	2.8
– 10–50	22.8	13
– 50–100	20.8	19.4
– > 100	42.6	61.1
<b>Length of the interfirm relationship</b>		
– < 1	2	.9
– 1–< 3	16.8	18.5
– 3–< 10	53.5	54.6
– 10–< 20	23.8	19.4
– > = 20	4	6.5
<b>Annual exchange volume (million RMB yuan)</b>		
– < 1	4	6.5
– 1–5	24.8	18.5
– 5–10	21.8	23.1
– 10–30	25.7	21.3
– > = 30	19.8	25.9
– N.a	4	4.6
<b>Position of the respondents</b>		
– High manager	13.9	4.6
– Middle manager	36.6	49.1
– Staff	40.6	40.7
– N.a	8.9	5.6

N.a. Not applicable

### 3.3 Sample characteristics

The sample includes two groups—the buyer sample (N = 101) and the supplier sample (N = 108). Table 1 shows the results of the respondent demographics of the buyer and supplier samples. In general, the buyer and supplier samples show rather homogeneous characteristics in the firms' type and size, the inter-firm relationships' length, and the respondents' competency.

More than two third of the companies in the buyer and supplier sample are Chinese private companies and regarded manufacturing as their main business. The majority of the firms had 100 to 500 employees, followed by firms with up to 100 employees. More than half of the respondents (53.5% of the buyer sample and 54.6% of the supplier sample) reported a relationship that the firm has maintained with the partner for 3–10 years, 27.8% (25.9%) for more than 10 years, 16.8% (18.5%) for 1–3 years, only 2% (0.9%) for less than one year. Nearly half of the firms (45.5% of the buyer sample and 47.2% of the supplier sample) generated an annual exchange volume with more than 10 million Chinese renminbi with its partner in the relationship surveyed; and around another half (46.5% of the buyer sample and 41.7% of the supplier sample) had an annual exchange volume with 1–10 million Chinese renminbi with the partner. In addition, 89.1% (74.1%) of the relationships considered in the buyer (supplier) sample are domestic relationships.

Of the respondents, about half the buyer and supplier questionnaires were answered by the top or middle management of the firm, including general managers, purchasing managers, supply managers, key account managers, sales managers, channel managers, export managers, brand managers, regional managers, project managers, or product development managers. The remaining respondents were salespersons or purchasing staff. Most of the respondents were responsible for the business relationship surveyed for more than three years and are quite familiar with the relationship partner.

## 4 Analysis and results

We conducted structural equation modeling (SEM) (Anderson and Gerbing 1988) to analyze the buyer and supplier data sets. We used SPSS Amos 26 software. We followed the recommendations of the minimum sample size of 100 observations recommended by Bommsma (1982) and 10 cases per construct recommended by Nunnally (1967). The research design is in line with recommendations to handle sparingly both the number of constructs and the number of indicators in the measurement model (Wolf et al. 2013). After an evaluation of the measurement model using the buyers' and suppliers' samples separately, a measurement invariance test across the buyers and suppliers groups was conducted. Subsequently, the structural model and the structural invariance were tested.

**Table 2** Results of the confirmatory factor analysis for the buyer and supplier models

Construct and indicators	Indicators standardized loadings (t-value)	
	Buyer (N = 101)	Supplier (N = 108)
<b>Trust</b> (Barnes et al. 2015; Doney and Cannon 1997):		
Buyers sample: Cronbach's $\alpha$ = .81, AVE = .55, CR = .83		
Suppliers sample: Cronbach's $\alpha$ = .81, AVE = .54, CR = .82		
TR1: This partner is genuinely concerned that my firm's business succeeds	.72 <sup>a</sup>	.87 <sup>a</sup>
TR2: My firm can rely on this partner to keep promises made to us	.84 (7.47)	.67 (7.25)
TR3: My firm trusts this partner keeps our best interest in mind	.61 (5.60)	.81 (9.09)
TR4: This partner is trustworthy	.77 (6.97)	.53 (5.54)
<b>Commitment</b> (Morgan and Hunt 1994; Jiang et al. 2016)		
Buyers sample: Cronbach's $\alpha$ = .89, AVE = .61, CR = .89		
Suppliers sample: Cronbach's $\alpha$ = .84, AVE = .52, CR = .84		
CLO1: The relationship that my firm has with this partner is something that my firm is very committed to	.77 <sup>a</sup>	.72 <sup>a</sup>
CLO2: The relationship that my firm has with this partner is something that my firm really cares about	.88 (9.11)	.76 (7.05)
CLO3: The relationship that my firm has with this partner deserves my firm's maximum effort to maintain	.79 (8.19)	.79 (7.26)
CLO4: We expect my firm's relationship with this partner to last a long time	.71 (7.15)	.66 (6.12)
CLO5: Maintaining a long-term relationship with this partner is important to my firm	.76 (7.77)	.67 (6.29)
<b>Relationship specific investment</b> (Nyaga and Whipple 2011)		
Buyers sample: Cronbach's $\alpha$ = .85, AVE = .66, CR = .85		
Suppliers sample: Cronbach's $\alpha$ = .83, AVE = .62, CR = .83		
RSI1: My firm has invested substantially in personnel dedicated to this relationship	.81 <sup>a</sup>	.80 <sup>a</sup>
RSI2: My firm has provided proprietary expertise and/or technology to this relationship	.84 (8.28)	.79 (7.98)
RSI3: My firm has dedicated significant investment in equipment or support system to this relationship	.78 (7.92)	.77 (7.82)
<b>Cooperation</b> (Fynes et al. 2008)		
Buyers sample: Cronbach's $\alpha$ = .75, AVE = .53, CR = .77		
Suppliers sample: Cronbach's $\alpha$ = .76, AVE = .52, CR = .76		
My firm cooperates extensively with this partner with respect to		
CO1: quality management	.75 <sup>a</sup>	.69 <sup>a</sup>
CO2: forecasting and production planning	.80 (6.61)	.78 (6.22)
CO3: process design (including production and delivery process)	.62 (5.54)	.69 (5.84)
<b>Innovative performance</b> (Gounaris and Tzempelikos 2014)		
Buyers sample: Cronbach's $\alpha$ = .91, AVE = .69, CR = .90		
Suppliers sample: Cronbach's $\alpha$ = .90, AVE = .66, CR = .89		
IP1: This relationship forces my firm to increase the quality of our products and upgrade the level of our services	.77 <sup>a</sup>	.74 <sup>a</sup>
IP2: This relationship makes my firm seeking ideas for product/service improvement	.74 (10.08)	.77 (12.05)
IP3: This relationship leads my firm to learn about technological advances	.89 (9.52)	.88 (8.99)
IP4: This relationship leads my firm to try to improve our operations	.91 (9.72)	.85 (8.66)
<b>Financial performance</b> (Barnes et al. 2015)		
Buyers sample: Cronbach's $\alpha$ = .87, AVE = .70, CR = .87		
Suppliers sample: Cronbach's $\alpha$ = .79, AVE = .58, CR = .81		
FP1: The relationship with this partner helped my firm save cost significantly against our major competitors	.87 <sup>a</sup>	.71 <sup>a</sup>
FP2: The relationship with this partner helped my firm increase profitability against our major competitors	.78 (10.08)	.85 (7.03)
FP3: The relationship with this partner helped my firm perform better financially against our major competitors	.85 (9.52)	.72 (6.47)

<sup>a</sup>Free parameters (no t-values)

#### 4.1 Validation of the measurement models

Table 2 shows the results of the confirmatory factor analyses and all items for each construct that were used in the analysis for the buyer and supplier data sets. Regarding the model fit, the ratio of chi-square to the degrees of freedom ( $\chi^2/\text{df}$ ) = 1.53 for the buyers model;  $\chi^2/\text{df}$  = 1.55 for the suppliers model) as well as the multiple fit indices (Comparative Fit Index (CFI) = .92, Incremental Fit Index (IFI) = .93, and root mean square error of approximation (RMSEA) = .072 for the buyers model; CFI = .91, IFI = .91, and RMSEA = .074 for the suppliers model) are within an acceptable range for both the buyer and supplier data set. This indicates an acceptable fit to the data (Hair et al. 2014).

The construct validity includes the convergent validity and the discriminant validity. The convergent validity was tested using the approaches as explained by Hair et al. (2014). All standardized loading estimates of the measurement items in the buyer and supplier models are within an acceptable range of factor loadings that should be .5 or higher. In addition, the average variance extracted (AVE) values of all constructs for both the buyer and supplier models are greater than .5. These suggest adequate convergent validity. Moreover, we used Cronbach's alpha to assess the internal consistency. The  $\alpha$ -values for all constructs in the buyer and supplier models are greater than .7, which shows high internal consistency. Furthermore, all composite reliability (CR) values are higher than .7, which demonstrates good reliability of both the buyer and supplier measurement models. To sum up, the results presented above allows the conclusion that the convergent validity of both the buyers and suppliers models is established.

The discriminant validity was evaluated by three methods: assessing cross-loadings, using the Fornell and Larcker's (1981) criterion, and Henseler et al.'s (2015) heterotrait-monomethod (HTMM) and monotrait-hetermethod (MTHM) approach. According to Gefen and Straub (2005), the assessment of cross-loadings provides a test of discriminant validity between the latent constructs. The results of the tests

using the buyer and supplier samples show that measurement items correlate more weakly with all other constructs than for the one to which it is theoretically associated. This reveals that the discriminant validity is established. Following the criterion recommended by Fornell and Larcker (1981), "the average variance extracted estimates for two constructs should be higher than the square of the correlation between these two constructs to provide evidence of discriminant validity". The results of the analyses showed that all scales passed the test for both models. Table 3 shows the descriptive statistics and the correlations among the constructs for the buyer and supplier samples. Henseler et al. (2015) criticized the Fornell and Larcker's (1981) procedure and suggested using the HTMM and MTHM approach to test discriminant validity. The results of analyses showed that the HTMM to MTHM ratio was .45 for the buyers' model and .49 for the suppliers' model. These were well below .85 they suggested. Therefore, we concluded that the discriminant validity of both the buyers' and suppliers' models is established.

The strength of a potential common method bias was assessed. This is necessary if all data are collected from a single source. Two tests were conducted following the process explained by Su et al. (2008) and Wu et al. (2015). First, we conducted Harmon's single-factor test (Podsakoff and Organ 1986). The unrotated factor results of the principal component factor analysis revealed that six distinct factors with eigenvalues above or near 1.0 explain 75.6% and 72.3% total variance for the buyer and supplier data set respectively. The first factor respectively accounted for 38.1% and 35.8% of the variance for the buyer and supplier data sets. These were lower than half of the total variance. Second, we conducted a confirmatory factor analysis of Harman's single-factor model. The model's fit indices of  $\chi^2/\text{df}$  = 3.79, CFI = .56, IFI = .57, RMSEA = .167 for the buyer sample and  $\chi^2/\text{df}$  = 3.68, CFI = .55, IFI = .56, RMSEA = .158 for the supplier sample were notably worse than those of the measurement model. These imply that a single factor is not acceptable and there is no serious common method bias problem in this study.

**Table 3** Descriptive statistics and correlations among constructs for the buyer and supplier models

Constructs	M (B)	SD (B)	M (S)	SD (S)	(1)	(2)	(3)	(4)	(5)	(6)
(1) Trust	5.68	1.34	5.82	1.25	1.00	.63	-.03	.59	.60	.50
(2) Commitment	5.93	1.30	6.24	1.11	.45	1.00	.10	.56	.62	.51
(3) Relationship specific investment	4.20	1.82	4.80	1.57	.47	.38	1.00	.29	.08	.16
(4) Cooperation	4.92	1.72	5.09	1.59	.36	.46	.36	1.00	.48	.48
(5) Innovative performance	5.56	1.33	5.93	1.16	.45	.52	.59	.67	1.00	.66
(6) Financial performance	5.02	1.55	4.77	1.53	.36	.52	.29	.44	.63	1.00

Correlations among constructs for buyer model appear above the diagonal from the column (1) to (6). Correlations among constructs for supplier model appear below the diagonal from the column (1) to (6)

*M (B)* Means of constructs in buyer sample, *SD (B)* standard deviations in buyer sample, *M (S)* Means of constructs in supplier sample, *SD (S)* standard deviations in supplier sample

## 4.2 Assessing measurement invariance

After validating the measurement model using the buyers' and suppliers' samples separately, we conducted a buyer–supplier-two-groups invariance test across the buyers and suppliers samples, following the multi-group approach as explained by Byrne et al. (2016). They suggested a three-level invariance test including the test of configural invariance, measurement invariance, and structural invariance. Measurement invariance across the buyers and suppliers groups is the prerequisite of the comparison of the buyers' and suppliers' structural model. We can use a multi-group approach, because the set of items for the construct measurement is the same in our buyer and supplier groups (see Table 2) and the two sample sizes (Buyers sample:  $N = 101$ , suppliers sample:  $N = 108$ ) are similar (Baumgartner and Steenkamp 1998). To determine evidence of invariance, we used the criteria as explained by Nyaga et al. (2010): “(a) the multigroup model should demonstrate an adequate fit to the data, and (b) the change in CFI ( $\Delta CFI$ ) value between models should be negligible” (p. 108).

In the first step, we tested configural invariance, in order to determine whether the same items measure the constructs across groups. To test this, we estimated the unconstrained buyers-suppliers-two-group baseline model (model 1). The overall model fit indices:  $\chi^2/df = 1.556$ , CFI = .917, IFI = .920, and RMSEA = .052 indicated a good fit of the data. This demonstrates that the configural invariance holds.

In the second step, we tested the measurement invariance, in order to determine whether the measurement model is equal across groups. To test the measurement invariance, three levels of invariance: metric, scalar, and strict factorial invariance should sequentially be evaluated (Byrne 2016). Firstly, we conducted the metric invariance test, which determined whether the factor loadings of the measurement items are equivalent across groups. We estimated a new model (model 2), in which we restricted all factor loadings of the measurement items to be equal. The overall model fit indices:  $\chi^2/df = 1.534$ , CFI = .916, IFI = .918, and RMSEA = .051 indicated an acceptable fit of the data. Comparing the constrained model (model 2) with the unconstrained model (model 1),  $\Delta CFI = .001$ , which showed a negligible change. The results of testing the individual factor loading invariance showed that only two out of 22 items were noninvariant across the two groups. This revealed that buyers and suppliers interpret the measurement items in our study equivalently in most cases.

Afterwards, we conducted the scalar invariance test, which determines whether the intercepts of the measurement items are invariant across groups. We estimated model 3, in which we restricted all observed variable intercepts to be equal and retained equality constraints of factor loadings except the two found to be noninvariant in the metric invariance test. The overall model fit indices:  $\chi^2/df = 1.558$ , CFI = .908,

IFI = .909, and RMSEA = .052 indicated an acceptable fit of the data. Comparing model 3 with model 1,  $\Delta CFI = .009$ , which showed a negligible change. The results of testing the individual intercept invariance showed that eight out of 22 intercepts were noninvariant across the two groups.

We did not conduct the strict factorial invariance test, which determines whether the individual indicator variable's error terms are equivalent across groups. Because the past studies suggest that the test of the measurement error invariance is overly restrictive and is of least importance (Byrne 2016; Nyaga et al. 2010). Overall, the results of assessing the measurement invariance indicate that the measurement model is consistent across the buyers and suppliers groups. Thus, a comparable baseline across the two groups was established and a structural invariance test was conducted. The results are presented in the next section.

## 4.3 Results of testing the hypotheses

Before we proceeded with the multi-group analysis to test whether the causal relationships between constructs vary across the buyers and suppliers groups, we tested the structural model using the buyers and suppliers data sets separately. The results of the fit statistics show that  $\chi^2/df = 1.53$ , CFI = .92, IFI = .93, and RMSEA = .072 for the buyer structural model and  $\chi^2/df = 1.59$ , CFI = .91, IFI = .91, and RMSEA = .074 for the supplier structural model are within an acceptable range, meaning an acceptable fit for both data sets. Subsequently, we used the multi-group analysis to test the structural model with the equality constraints of the item factor loadings across the buyers and suppliers groups except the two found to be non-invariant in the metric invariance test (see Sect. 4.2). The standardized and unstandardized structural weights with t-values and p-values are shown in Table 4 for the buyer and supplier samples. These standardized structural weights were “the best estimates of the true structural weights” (Deng et al. 2005, p. 754), because they were not influenced by differences in factor loadings across groups. As can be seen in the table, seven of the 13 structural paths were different in significances between buyers and suppliers. Of the control variables, none of the relationships examined is statistically significant in the buyers or suppliers model. This excludes the confounding effects of firm size and relationship length.

To test whether the structural weights are significantly inequivalent across the buyers and suppliers groups, we conducted a structural invariance test by using the multi-group analysis. We estimated a model, in which we constrained all structural weights to be equal across the buyers and suppliers groups and retained equality constraints of factor loadings except the two found to be non-invariant in the metric invariance test. The overall model fit indices:  $\chi^2/df = 1.547$ , CFI = .912, IFI = .914, and RMSEA = .051 indicated a good

**Table 4** Results of testing the structural models

Paths	Buyers sample		Suppliers sample		Results of testing the hypotheses
	Structural weight	t-value and p-value	Structural weight	t-value and p-value	
H1a: Trust → cooperation	.44 (.48)	3.04**	.07 (.07)	.41 ns	Supported
H2a: Commitment → cooperation	.25 (.31)	1.83 ns	.35 (.52)	2.49*	Supported
H3a: RSI → cooperation	.28 (.24)	2.71**	.21 (.19)	1.50 ns	Supported
H1b: Trust → innovation	.33 (.29)	2.25*	.03 (.02)	.23 ns	Supported
H2b: Commitment → innovation	.38 (.38)	2.98**	.19 (.22)	1.69 ns	Supported
H3b: RSI → innovation	.03 (.02)	.29 ns	.36 (.25)	3.24**	Supported
H1c: Trust → financial performance	.09 (.11)	.62 ns	.06 (.07)	.43 ns	Rejected
H2c: Commitment → financial performance	.09 (.12)	.66 ns	.23 (.36)	1.67 ns	Rejected
H3c: RSI → financial performance	.08 (.08)	.81 ns	-.17 (-.16)	-1.13 ns	Rejected
H4: Trust → commitment	.61 (.53)	5.36***	.53 (.39)	4.77***	Rejected
H5: Cooperation → Innovation	.07 (.06)	.49 ns	.44 (.34)	3.82***	Supported
H6: Cooperation → financial performance	.13 (.14)	.87 ns	.02 (.02)	.09 ns	Rejected
H7: Innovation → financial performance	.48 (.66)	3.62***	.56 (.79)	3.02**	Rejected
Control variables					
Firm size → cooperation	-.04	-.37 ns	.14	1.42 ns	
Firm size → innovation	-.15	-1.74 ns	-.08	-1.04 ns	
Firm size → financial performance	.07	.83 ns	.11	1.12 ns	
Relationship length → cooperation	-.03	-.29 ns	-.02	-.24 ns	
Relationship length → innovation	.04	.49 ns	.07	.82 ns	
Relationship length → financial performance	.02	.27 ns	-.09	-.94 ns	

Value outside the parentheses is a standardized structural weight. The value inside the parentheses is the unstandardized structural weight

ns Not significant

\*Significant at  $p < .05$ ; \*\*Significant at  $p < .01$ ; \*\*\*Significant at  $p < .001$



fit of the data. Then, we tested the invariance of the individual structural weights by constraining only one individual structural weight at a time. The results suggested that four of the 13 structural weights were significantly non-invariant across the two groups: from trust to cooperation (significance was .07) and innovation (significance was .10), from RSI to innovation (significance was .03), and from cooperation to innovation (significance was .06). Synthesizing the results of testing the structural models across buyers and suppliers and the structural invariance test, we concluded that seven of the 13 relationships are different in significances and/or structural weights between buyers and suppliers, which indicates that seven of the 13 hypotheses were supported, while the other six hypotheses were rejected (see Table 4). The results are explained in detail in the following paragraphs. Figure 2 illustrates the buyer–supplier differences presented in our study.

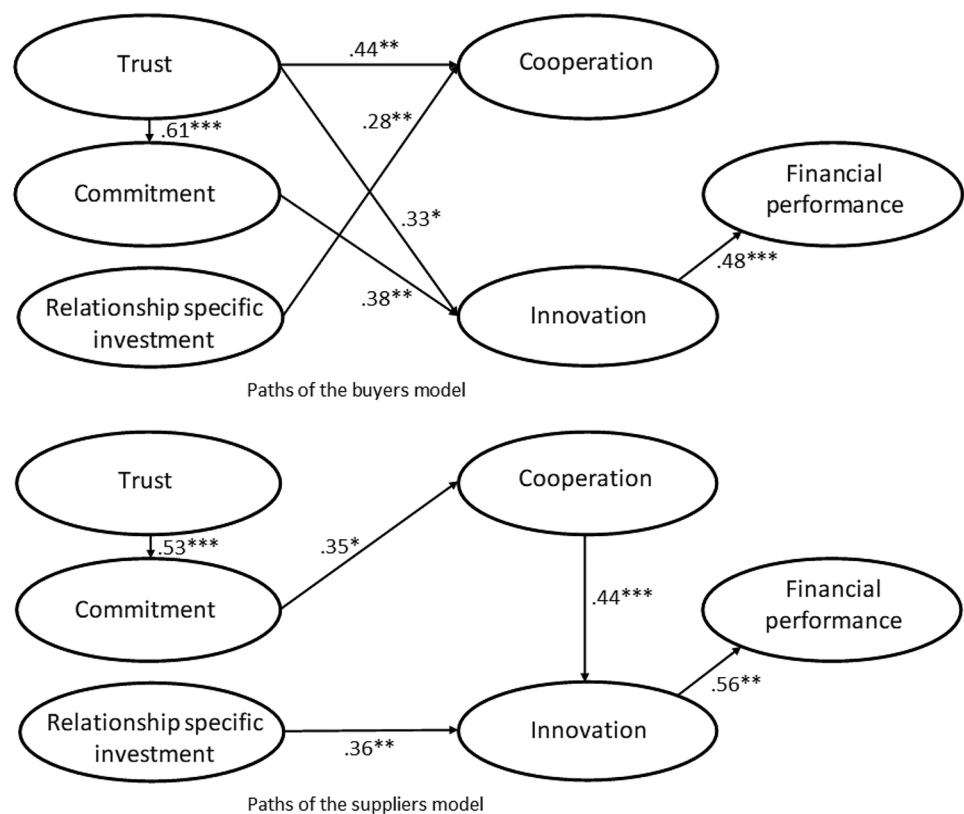
As can be seen in Table 4, for buyers, trust was more important ( $\beta = .44$ ) than commitment ( $\beta = .25$ ) and RSI ( $\beta = .28$ ) for determining cooperation. The structural weight for the path from commitment to cooperation was non-significant for buyers, indicating that a buyer's commitment to a supplier relationship was not important for the buyer's cooperation with this supplier. In contrast, commitment ( $\beta = .35$ ) was obviously more important than trust ( $\beta = .07$ ) and RSI ( $\beta = .21$ ) for cooperation for suppliers. The structural weights for the direct

paths from trust and RSI to cooperation were non-significant for suppliers, suggesting that a supplier's trust in a buyer or its specific investment in a buyer relationship will not lead to the supplier's cooperation with this buyer directly. In summary, the influence of trust on cooperation was significantly higher for buyers than for suppliers. The direct influence of commitment on cooperation was significant only for suppliers and the direct influence of RSI on cooperation was significant only for buyers. Thus, H1a, H2a, and H3a were supported.

In addition, a buyer's trust in ( $\beta = .33$ ) and commitment to ( $\beta = .38$ ) a supplier relationship had approximately equivalent efficacy in affecting the buyer's innovation performance resulting from the supplier relationship; however, a buyer's RSI ( $\beta = .03$ ) was not significantly correlated to its innovation. In contrast, a supplier's RSI ( $\beta = .36$ ) was more important than its trust in ( $\beta = .03$ ) and commitment to ( $\beta = .19$ ) a buyer relationship in influencing the supplier's innovation. The influence of trust on innovation was significantly higher and the influence of RSI on innovation was significantly lower for buyers than for suppliers. Besides, the direct influence of commitment on innovation was significant only for buyers. Thus, H1b, H2b, and H3b were supported.

Furthermore, none of trust, commitment, and RSI has a significantly direct impact on financial performance from both buyers' and suppliers' perspectives. The invariance test showed that the structural paths from trust, commitment, or RSI to

**Fig. 2** Different paths of the buyers and suppliers models. Note: Values beside the path are the standardized structural weights. \*Significant at  $p < .05$ . \*\*Significant at  $p < .01$ . \*\*\*Significant at  $p < .001$



financial performance were invariant across the buyers and suppliers groups (Significance was .86, .42, and .17). Thus, H1c, H2c and H3c were not supported. However, it seems that a buyer's trust in and commitment to a supplier relationship lead to the buyer's financial performance indirectly through its innovation. In addition, a supplier's trust in, commitment to, and specific investment in a buyer relationship also result in the supplier's financial performance indirectly. As can be seen in Fig. 2, buyers and suppliers tend to exhibit different paths from the three relationship factors leading to financial performance.

Moreover, trust is the immediate determining factor of commitment for both buyers ( $\beta = .61$ ,  $p < .001$ ) and suppliers ( $\beta = .53$ ,  $p < .001$ ), confirming the commitment-trust theory by Morgan and Hunt (1994). The structural weights from trust to commitment were invariant across the buyers and suppliers groups (Significance was .23). Thus, H4 was not supported. Higher level of cooperation lead to higher level of innovation for suppliers ( $\beta = .44$ ,  $p < .001$ ), whereas cooperation has no direct impact on innovation for buyers ( $\beta = .07$ ,  $p = .627$ ). The influence of cooperation on innovation was significantly lower for buyers than for suppliers. Thus, H5 was supported. Cooperation has no significantly direct influence on financial performance for both buyers and suppliers. The structural weights were invariant across the buyers and suppliers groups (Significance is .60). Thus, H6 was not supported. Innovation is the direct antecedent of financial performance for both buyers ( $\beta = .48$ ,  $p < .001$ ) and suppliers ( $\beta = .56$ ,  $p < .01$ ). The structural weights were invariant across the two groups (Significance was .68). Thus, H 7 was not supported.

In addition to the direct effect analyzed above, we also calculated the indirect effect of trust, commitment, and RSI influencing cooperation, innovation, and financial performance as well as their significance level for buyers and suppliers separately (see Table 5), as Fig. 2 illustrates some

indirect effects of the relationship factors on performance. A bias-corrected bootstrapping procedure on 2,000 samples was conducted. As can be seen in Table 5, besides the direct effect ( $\beta = .33$ ), trust has an indirect effect on innovation ( $\beta = .28$ ,  $p = .30$ ) for buyers. In addition, trust ( $\beta = .42$ ,  $p = .006$ ) and commitment ( $\beta = .24$ ,  $p = .029$ ) have indirect effect on financial performance respectively, while neither of them has a direct effect on financial performance for buyers. Furthermore, for the suppliers model, trust has an indirect effect on cooperation ( $\beta = .18$ ,  $p = .01$ ), though the direct effect was non-significant. Moreover, trust ( $\beta = .20$ ,  $p = .047$ ) and commitment ( $\beta = .16$ ,  $p = .01$ ) have indirect effect on innovation respectively, while the direct effects were non-significant. Finally, trust ( $\beta = .25$ ,  $p = .032$ ), commitment ( $\beta = .19$ ,  $p = .036$ ), and RSI ( $\beta = .26$ ,  $p = .014$ ) have indirect effect on financial performance respectively, while neither of them has a direct effect on financial performance.

## 5 Discussion

### 5.1 Discussion of the empirical results and contributions

This paper analyzes the efficacy of three relationship factors: trust, commitment, and RSI on three types of firm performance: cooperation, innovation, and financial performance, matching buyers' and suppliers' perspectives. Our empirical results contribute to contemporary knowledge of SC relationship research in two main ways. First, our study demonstrates that the efficacies of trust, commitment, and RSI influencing buyers' and suppliers' performance are different. This differs from the previous SC relationship research that adopted second-order relationship models and confirmed the aggregate effect of trust, commitment and RSI on performance (e.g., Chu and Wang 2012; Li 2021; Nyaga and Whipple 2011), or that focused on only one relationship factor in a study and failed to clarify the efficacy of the various relationship factors influencing performance (e.g., Chiang et al. 2018; Patrucco et al. 2020; Huang and Huang 2019). Second, this paper compares buyers' and suppliers' perspectives by using two independent samples: a buyer sample and a supplier sample. The results reveal that buyers and suppliers though have some similar perspectives on SC relationship performance, they tend to exhibit different paths from relationship factors leading to performance. This finding adds to the existing literature, which highlights the buyer–supplier differences in SC relationships (e.g., Ambrose et al. 2010; Kim et al. 2010; Nyaga and Whipple 2011). However, it seems inconsistent with the conclusion by Nyaga et al. (2010), who stated that buyers' and supplier's perspectives “are more similar than they are different”

**Table 5** Indirect effects of the relationship factors affecting performance for the buyer and supplier models

Paths	Indirect effect	
	Buyer	Supplier
Trust → cooperation	.17 ns	.18*
Commitment → cooperation		
RSI → cooperation		
Trust → innovation	.28*	.20*
Commitment → innovation	.02 ns	.16*
RSI → innovation	.02 ns	.09 ns
Trust → financial performance	.42**	.25*
Commitment → financial performance	.24*	.19*
RSI → financial performance	.06 ns	.26*

ns Not significant

\*Significant at  $p < .05$ ; \*\*Significant at  $p < .01$ ; \*\*\*Significant at  $p < .001$

(p. 109). In the following paragraphs, we discuss the results of our study in detail.

Our study reveals that the role of trust, commitment, and RSI in influencing buyers' cooperation performance differs from that in influencing suppliers' cooperation performance. Trust is an immediate precursor of buyers' but not suppliers' cooperation performance. This is in line with the finding by Kim et al. (2010). A trusting relationship with a buyer does not directly lead to supplier's active cooperation in joint activities, as suppliers realized that the relationship is about business "pay off" in the end and the buyer may switch to an alternative for a better deal, if its expectation could not be met (Nyaga et al. 2010). Trust is not sufficient to foster supplier's intensive cooperation with the buyer. The new findings of our study are that commitment and RSI also play different roles in buyers' and suppliers' cooperation. When suppliers are committed to the buyer relationship and perceive that the relationship with the buyer is so important as to warrant their maximum efforts at maintaining it, they are more likely to engage in intensive collaborative activities, which may incur massive costs. In contrast, commitment is not a decisive determinant of cooperation for buyers and buyers may not be committed to joint activities even if they are committed to the transaction relationship. This means that the relationship stays at arm's length. However, if buyers believe that the supplier keeps their best interest in mind, and will achieve outstanding performance to meet their expectations through joint activities in such as quality management, production and delivery planning, etc., they may engage in collaborative activities. Further, RSI is necessary for buyers to cooperate, but not for suppliers. This may be attributed to the reason that in a SC relationship, extensive cooperation is likely to be driven more by the buyer than the supplier, which implies that the buyer must make dedicated investment in personal, expertise and technology to make the cooperation work.

Surprisingly, neither buyers nor suppliers tend to consider their cooperation performance an immediate precursor of financial performance. This finding is accordant with the study by Barnes et al.'s (2011), who attributed the reason for this result to the behavioral nature of cooperation, which normally causes costs. If the benefits from the cooperation cannot compensate for the cost, cooperation may even negatively affect the financial performance. In addition, the relational view places the "strategic" requisition on the cooperation. Relational rents are possible when valuable, rare, imperfectly imitable and substitutable inter-organizational resources are generated through strategic cooperation. Such cooperation requires the SC partners to make RSI, exchange relevant information and expertise, and combine "complementary, but scarce resources or capabilities [...], which results in the joint creation of unique new products, services, or technologies" (Dyer and Singh 1998, p. 662). The

relational rents might be maintained through "interorganizational asset interconnectedness", "partner scarcity" and "resource indivisibility" (p. 672). Without these strategies, cooperation may easily be imitable and substitutable by the competing firms and would not generate the financial return.

Furthermore, our study reveals that the paths from the relationship factors leading to firms' innovation performance for buyers differ from those for suppliers. While trust and commitment are the direct antecedents of buyers' innovation performance, they lead to suppliers' innovation performance indirectly through suppliers' cooperation performance. Cooperation performance is a critical factor leading to innovation performance for suppliers but not for buyers. This is a new finding. This result is in line with prior studies, which highlighted that collaboration in joint development activities and close relational ties are effective mechanisms for cultivating suppliers' innovation capabilities (e.g., Pihlajamaa et al. 2019; Yam and Chan 2014). Cooperation with the customer enables the supplier to be clearer on its customer's need. This forces the supplier to develop and implement ideas gained through cooperation to attain outstanding performance and satisfy the customer (Zeng et al. 2013). In contrast, a buyer's innovation capacity is more driven by its customer. A buyer's trust in and commitment to a supplier relationship is likely to be a sign that the buyer could benefit from the relationship, as the supplier provides products or services, which help the buyer to increase the quality of its products, upgrade the level of its services, or have some technological advances. The result that the impact of cooperation performance on innovation performance was significantly higher for suppliers than for buyers is in line with the study by Van der Valk et al. (2016), who found that an extensive cooperation with the supplier is not a decisive determinant of the buyer's innovation. In accordance with this, another new finding of our study is that RSI is a decisive determinant of innovation performance for suppliers but not for buyers. Through investment in personal and resources dedicated to the customer relationship, suppliers will gain a clearer idea of customers' needs, which enables their innovation in order to customize the features of products or services.

Finally, while many SC relationship studies have confirmed the positive aggregate effect of relationship quality on financial performance (e.g., Chu and Wang 2012; Song et al. 2012; Lai et al. 2013; Gounaris and Tzempelikos 2014), our paper adds to these studies by exploring the paths from the individual relationship factors leading to financial performance. The results show that none of the three SC relationship factors: trust, commitment or RSI has a direct impact on financial performance from both buyers' and suppliers' perspectives. Trust and commitment lead to financial performance indirectly through innovation performance for both buyers and suppliers, and innovation performance is

a vital determining factor of financial performance. This confirms the previous research that considers trust and commitment the key relationship factors for achieving firms' competitive advantages through building and maintaining high quality SC relationships (Qian et al. 2021b). However, different from trust and commitment, RSI indirectly leads to financial performance only for suppliers but not for buyers. This new finding may be attributed to the reason that the potential revenue and profit generation depends on the business success with customers. The effort made by suppliers through dedicated investment in personal and resources to improve innovation and thus achieving outstanding role performance towards customers is likely to increase customers' satisfaction and thus the sales to and profits from the customers. In contrast, specific investment in a supplier relationship is not significantly correlated to buyers' financial performance.

The comparison of the paths of the buyers and suppliers models demonstrates that while both buyers and suppliers are able to achieve benefits through developing and maintaining high-quality SC relationships, the paths from the individual relationship factors leading to performance may exhibit different patterns between buyers and suppliers. The theoretical framework of resource-based view and relational view provides a general framework for explaining the key relationship determinants of firms' competitive advantages; however, they do not differentiate buyers' and suppliers' perspectives in SC relationships. Adding to these frameworks through differential buyers' and suppliers' perspectives would have an impactful implication for theories.

## 5.2 Managerial implications

This paper draws some managerial implications in the Chinese business context in particular. First, we would suggest that building high-commitment relationships with trustworthy SC partners provides worthwhile benefits to both buyers and suppliers. It helps strengthen firms' innovation performance, generate financial return, and thus develop a sustainable competitive advantage. As firms' innovation is a critical factor leading to financial performance, managers are encouraged to innovate and facilitate firms' continual improvement by effectively managing relationships with their SC partners. It is particularly beneficial that through showing their relationship commitment to the trustworthy partners, managers strive to facilitate the business partners' reciprocal behaviors, such as resource commitments to expertise and equipment (Nyaga et al. 2013). By proactively using this expertise and equipment, firms should innovate to improve their role performance for their customers and thus achieve high financial performance (Barnes et al. 2015; Fang et al. 2011).

In addition, investment in personnel and resources dedicated to the customer relationship is particularly important for helping supplying firms gain ideas for innovation to meet customers' needs. Therefore, managers of the supplying firms should try to strengthen their innovation performance through effectively investing personnel and resources in the relationship with customers. However, for buyers' innovation, dedicated investment in the supplier relationship is not as significant as their trust in and commitment to the supplier relationship.

Furthermore, managers of supplying firms should be aware that it is beneficial for them to work on activities such as process design, forecasting, production planning, and quality management jointly with the customers, who they are really trust in and are committed to. Supplying firms' cooperation performance would lead to their innovation and thus improved role performance for their customers, which in turn increases their financial performance. However, managers of buying firms should notice that the effort on joint working relationships with their suppliers may not lead to relational rents, if the collaborative activities cannot generate valuable and scarce inter-organizational resources, or the cooperation can easily be imitated and substituted by the competitors. Managers should understand that to generate relational rents through cooperation with the suppliers, they should determine and estimate feasible complementarities of their own firms' and their potential suppliers' resources and capabilities and try to combine the complementary resources and capabilities through cooperation (Dyer and Singh 1998). They need to decide on the level and type of their RSI, which yields higher productivity effects, more difficult for competitors to duplicate and thus has an overall ability to generate higher value (Palmatier et al. 2007).

## 5.3 Limitations and future research

Despite the contributions, we recognize that this paper has several limitations. First, we selected mainland China as the research context. The conclusion of the study may not be generalizable to other economics or cultures due to many differences in systems and cultures between China and other countries (Wu et al. 2015). For example, Nyaga et al. (2010), who conducted their research in the Western business context, concluded that buyers' and suppliers' perspectives are more similar than they are different. Some studies have also provided evidence that differences on the impact of SC relationship management practices on firm performance exist between different countries and the efficacy of SC management practices is highly dependent on culture (e.g., Avery et al. 2014; Kristal et al. 2011). Consequently, we would suggest that the impact of relationship factors on performance may vary in various business contexts, which should be researched in future studies.



Second, the questionnaire requested the respondent to consider a significant relationship with a supplying or a buying firm in his/her firm's SC. This significant relationship refers to an important relationship for a company according to the subjective assessment of the respondents. For instance, if the relationship has been for a relatively long time, or the company has a considerable annual exchange volume with the relationship partner, or the relationship is not likely to be substituted. This might have led to a selection bias towards more positive relationships. We consider this a limitation of our research.

Third, the ability to make causal inferences is limited by using the cross-sectional design in this study. This can only be resolved by using a longitudinal research design. Since relationships are dynamic in nature, the longitudinal research will further the aim of improving our understanding of the continuous development of relationships, and thus the relationships of various RQ factors in different stages of the relationship development and maintenance (e.g., Shamsollahi et al. 2021; Zhang et al. 2016). In addition, benefits resulting from the relationship may not be immediately forthcoming. It may take time to compensate and exceed the cost invested in the relationship. Therefore, a longitudinal study (e.g., Palmatier et al. 2007) would yield some insights not captured in this study.

Fourth, we acquired data from both buyers and suppliers in our study; however, within an individual SC relationship, only one side—either the buyer or the supplier—was examined. To collect and compare data from both sides of a matched paired of dyadic relationship between the SC partners would be a valuable future contribution.

Fifth, we used sparing sample size in our study ( $N = 101$  for the buyers sample and  $N = 108$  for the suppliers sample), following the recommendations of the minimum sample size of 100 observations (Bommsma 1982). The results of our study showed that the fit statistics are fine; however, some researchers considered a larger sample size for SEM would be reasonable (e.g., Hoogland and Boomsma 1998). Therefore, we consider the sparing use of the sample size a limitation of our study.

Sixth, this paper considered the three direct relationship performance drivers—trust, commitment, and RSI based on the Palmatier et al.' (2007) paper. Relationship antecedents such as communication, dependence, and relational norms were not included in the study. Future research should extend the current model and include these factors, in order to examine their efficacy in influencing performance and the potential differences between buyers and suppliers. In addition, the other types of performance, for example environmental and social performance, would also be interesting outcomes of SC relationships to study.

## 6 Conclusion

Relationships developed and maintained with SC partners have increasingly been viewed as important sources for achieving high performance and thus a sustainable competitive advantage for firms involved in SCs by both academics and practitioners (e.g., Hüseyinoğlu et al. 2020; Li 2021; Yang et al. 2021). This paper analyzes the efficacy of three relationship factors: trust, commitment, and RSI affecting three types of firm performance: cooperation, innovation, and financial performance, comparing buyers' and suppliers' perspectives. It contributes to the existing SC relationship research by highlighting that (1) the efficacies of trust, commitment, and RSI influencing buyers' and suppliers' performance are different; (2) the paths from the relationship factors leading to performance form patterns that differ between buyers and suppliers. The major findings are summarized as follows:

- Trust and RSI are the direct antecedents of buyers' cooperation performance, while commitment is the immediate precursor of suppliers' cooperation performance.
- Trust and commitment lead to buyer's innovation performance directly, while RSI is not relevant for innovation for buyers. RSI is a direct driver of supplier' innovation performance; however, trust and commitment lead to suppliers' innovation performance indirectly through their cooperation performance.
- Trust and commitment lead to financial performance indirectly for both buyers and suppliers. However, RSI is not a significant factor for buyers' financial performance, whereas RSI will generate financial return for suppliers.
- Firms' innovation performance is a critical factor on the path from SC relationship factors leading to financial performance from both buyers' and suppliers' perspectives, while cooperation performance seem to be a relevant influencing factor leading to innovation and financial performance only for the suppliers.

These findings go beyond the existing SC relationship quality research that discussed either the aggregate effect or only one of various relationship factors influencing performance (e.g., Chiang et al. 2018; Chu and Wang 2012; Huang and Huang 2019; Li 2021; Nyaga and Whipple 2011; Patrucco et al. 2020). In addition, the findings support the existing literature, which argued for that buyers and suppliers benefit in divergent ways in collaboration relationships (e.g., Ambrose et al. 2010; Kim et al. 2010; Nyaga and Whipple 2011) and we provide further insight into the differences in relationship performance appraisals between buyers and suppliers. Based on these findings differentiated managerial implications are provided for managers of buying firms and



supplying firms. This would help them effectively manage relationships to improve performance in the Chinese business market in particular. However, we recognize that the conclusion of this paper may not be generalizable to economies or cultures outside mainland China due to the cultural and institutional differences between China and other countries. The findings should be validated in further studies, which are to be conducted in other economies or cultures, as the impact of relationship factors on performance may vary in various business contexts. Out of the findings, a simple model could be made and used by suppliers and buyers to emulate.

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## Declarations

**Conflict of interest** None.

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