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How Do Information Technology Resources Facilitate Relational and Contractual Governance in Green Supply Chain Management?

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Abstract: Although a plethora of studies demonstrate that information technology (IT) has a positive influence on integration, collaboration and coordination side of green supply chain management, our knowledge about the influence of IT resources on governance side remains limited, especially the relational and contractual governance, two of the fundamental governances in green supply chain management. Based on the transaction and agency cost perspective and literature of information systems and B2B governance, this study investigates how IT resources affect the effects of relational and contractual governance. The results show that IT resources could improve the relational governance (i.e., joint-actions) and contractual governance (explicit and contingent contract clauses designing), and thus, effectively mitigate partner's opportunism. Finally, the theoretical contribution and implications for managers are also given in the end.

Keywords: IT resources; green supply chain; relational governance behaviors; formal contract; partner's opportunism

1. Introduction

Information Technology (IT hereafter) is an increasingly important factor in improving the efficiency of green supply chain management and reducing the expenditures on time, fuel and other natural resources. For example, computers and servers could automatically process, store and analyze data and information related to the operation status of the supply chain. In the past, such data and information have to be collected and managed manually. Instant messenger programs, e.g., Sametime, Dingtalk, could improve the efficiency and effectiveness of communication and coordination between supply chain partners. Internet-based systems or platforms, e.g., SAP S/4HANA Cloud, could automate and expedite many business operations in supply chain management, which in turn, decreases the time, energy and money and eases the burden of the environment. For example, Wal-Mart developed an information system, Collaborative Forecast and Replenishment (CFAR), which linked the company with its suppliers. By using the system, Wal-Mart and its suppliers would efficiently and effectively track the state of order, packing, inventory, and payment.

The researchers of information system and supply chain management have thoroughly explored and confirmed the positive effect of IT on supply chain integration, coordination or collaboration [1–3]. However, the governance side of supply chain management is ignored. Specifically, the partner's opportunistic behaviors are inevitable in a supply chain because of information asymmetry, bounded rationality and separate legal entities with individual profit claims [4–7]. If the partner's opportunism cannot be governed properly, the supply chain operation expenditures on time, energy and other environmental resources would increase dramatically, and thus, decrease the operation efficiency of green supply chain management. In general, properly governing partner's opportunism is important to the green supply chain management [8–10].

Researchers in marketing strategy and the B2B marketing area have identified two fundamental governances to mitigate partner's opportunism: the relational norms and formal contract [10–12]. The relational norms refer to the social binding system that suppresses the business partners' opportunism by non-coercive social norms or cultures in B2B relationship. Comparatively, the formal contract refers to the legally binding system that suppresses the business partner's opportunism by coercive law or regulations in B2B relationship [13]. Although the relation and formal contract (and their interaction) have been investigated thoroughly [10–12], no studies were found to investigate how IT affects the relational and contractual governance and accordingly affects partner's opportunism. In general, the following thought is the main research question of this study:

How do IT resources influence the effects of relational and contractual governance and mitigate partner's opportunism?

The present study would suggest two contributions to information systems and supply chain management literature and B2B governance literature respectively. First, as mentioned above, both of the information systems and supply chain studies ignore the impacts of information technology on relational and contractual governance in green supply chain management. Furthermore, the detailed procedures of the IT resources affecting relational and contractual governance are still unclear. This study would recommend a theoretical model to investigate detailed procedures and corresponding results to fill this gap. Specifically, this study would try to explore how IT resources affect relational and formal contract governance, and on partner's opportunism. Thus, the results would extend information systems and supply chain management literature by introducing relational and contractual governance into IT-related studies in the two areas.

Secondly, the present study would be a supplement to the B2B governance literature. Specifically, prior B2B governance literature has paid heavy attention to relational and contractual governance or their interactions, few studies examine the effects of IT resources on the two governance. For example, Jean, Sinkovics and Cavusgil [14] suggest that supplier's IT resources would improve the efficiency of cooperative (relational) and monitor governance. However, they pay little attention to the contractual governance. This study would try to untangle the process that IT resources affect both relational and contractual governance. Accordingly, the results would benefit the studies of B2B governance.

In practice, this study is also helpful for practitioners to enhance the green supply chain management performance by IT resources. To a firm, an efficient and effective (i.e., green) supply chain is a crucial source of competitive advantage [15,16]. Once the firm gains the competitive advantage of this aspect, it will last longer and be hard to copy. Therefore, the conclusions of this study will help practitioners to have faith in improving relational and contractual governance, and thus, in mitigating partner opportunism by IT resources in green supply chain management. Furthermore, practitioners will also know the different roles of two types of IT resource on relational and contractual governance. This is helpful for them to make more efficient and effective IT strategies and investments.

2. Theoretical Background and Hypotheses

The relational governance advocates that the business exchanges can be coordinated by social relations and shared social norms [17], such as flexibility [18], solidarity [19], information exchange [19], trust [20], commitment [20] and mutuality [21]. However, Zhuang, Xi, and Tsang [22] propose that the relational norms are invisible and need specific relational behaviors as carriers. This is because only the behaviors are visible and judged by the other party. Namely, the relational norms implicitly play roles in relational behaviors between firms of the supply chain. Thus, it is the specific relational behaviors that have direct effects in the governing partner's opportunism. Based on this notion, in this study, relational governance refers to the relational governance behaviors between two parties. Specifically, the relational behaviors are manifested in joint-actions including ex-ante joint-planning and ex-post joint-problem-solving [22,23].

Comparatively, the contract governance suggests that the partner's opportunism can be mitigated by contract clauses which have the coercive force based on legal systems and institutions of the

country. The clauses define the duties and rights of each party, and process and procedures of the exchange relationship [24]. Once a party violates the clauses, the other party may accordingly claim and protect his rights and benefits by suing. However, because of bounded rationality, designing complete contracts is infeasible for the state of products (or service) that is exchanged in the future [25]. That is, no contract is complete and the contract clauses cannot delineate all the situations, circumstance and unexpected events that may happen in the coming future, no matter how explicit the clauses are [25]. Therefore, the contingency clauses should be included to make up for the limitations of explicit contract clauses. Specifically, the contingency refers to the unexpected events that happen during the contract execution and could not be covered by explicit contract clauses. Thus, the contingency clauses would be some principle or approaches to deal with such unexpected events and unforeseen circumstances and problems. Therefore, the design of both the explicit clauses and contingent clauses must be considered. In general, the contract governance refers to the extent to which the deal is organized and protected by explicit clauses and the contingency clauses.

Both relational and contractual governance include a variety of interactions between two partners, e.g., joint-planning, joint-problem-solving, and explicit and contingent contract clauses drafting. From the perspective of transaction and agency costs, there are several costs incurred by the interactions. Specifically, the first is the cost spent on data and information preparation for interactions between two firms. For example, during joint-planning, the future production plan would be based on previous sales data, the price of raw materials, competitor's movement, etc. If the firm wants such data and information to be prepared well and sufficiently, it would spend much time, energy and cost to ensure this. The second is the cost spent on communication and coordination between two firms. For example, during contingent contract clauses designing, two firms need to discuss and clarify many situations and circumstances they may encounter in the future, specific duties and rights of each party when unexpected events happen, and corresponding solutions to the unexpected events. Thus, firms need invest much time, energy and cost in communication and coordination.

In recent years, IT resources, as an alternative, would play an indispensable role in reducing the agency and transaction costs, i.e., the data and information preparation cost, and the communication and coordination cost [14,26–30]. Specifically, the IT resources are composed of infrastructure resources and human resources [31,32]. Advanced IT infrastructure resources, e.g., recently released computers, servers, network devices, and professional software and systems, have high speed and professional features for processing data, transmitting information, which would reduce the time, energy and cost spent in data and information preparation, and communication and coordination. On the other side, experienced and knowledgeable IT personnel would provide timely and accurate technical support for users about computers, network devices, software and systems operation, and technical solutions, which would improve users' capabilities of using IT devices, equipment, and software and systems to facilitate relational and contractual governance.

In general, from the perspective of agency and transaction cost, advanced IT devices, equipment and software and systems could improve the efficiency and effectiveness of relational and contractual governance. Technical support by experienced IT human resources would improve the positive influence of IT resources on relational and contractual governance. Finally, based on the governance literature, effectively relational and contractual governance would mitigate the partner's opportunistic behaviors. The theoretical framework is presented in Figure 1.

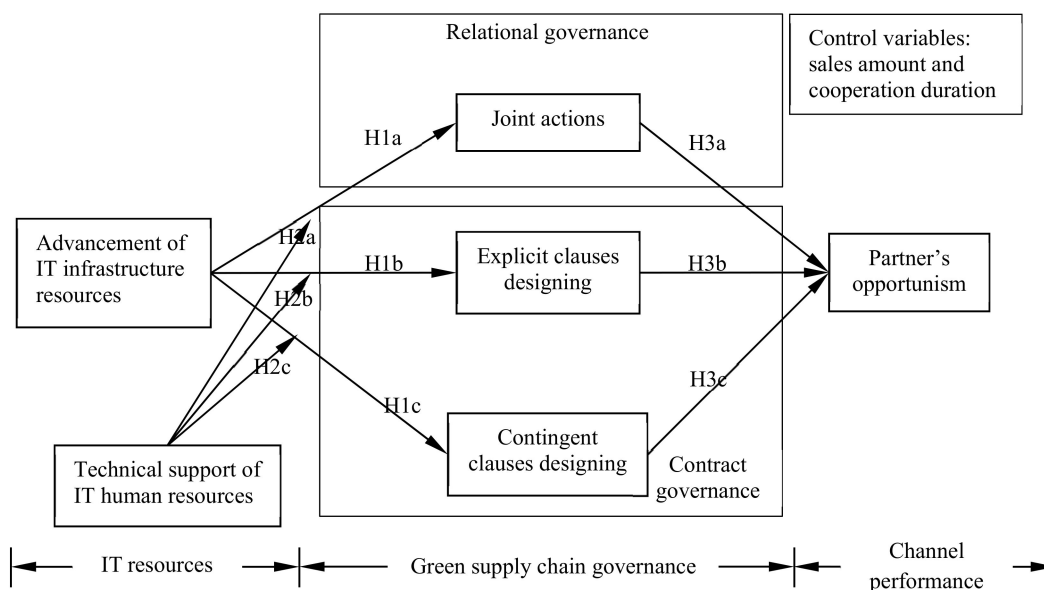


Figure 1. Conceptual model and Hypothesis.

2.1. The Direct Effects of IT Infrastructure Resources

IT infrastructure resources include a variety of hardware (e.g., laptops, servers, network devices, etc.), and software and systems (e.g., database management system and SAP systems, etc.) [31,32]. Firstly, the value of advanced computers is mainly manifested in the speed and performance of information processing and data management. For example, compared to the early released computers, the later released computers would have powerful CPU, larger memory and hard disk, and faster system speed, etc. which could help the user compress and decompress files more quickly, store, index, retrieve and filter information more efficiently, and compare, calculate and analyze data more effectively. Therefore, advanced computers would reduce the cost incurred by preparing information and data [33].

Secondly, the value of advanced network devices, e.g., wireless routers, is mainly manifested in the more convenient and faster end-to-end network connections. For example, compared to the old wireless router that has no more than 300 M bandwidth, the newest one would have more than 1000 M bandwidth. Thus, the real-time work progress synchronization, immediate data exchanging and information sharing between supply chain partners would be feasible by adopting newly released network devices. In addition, combined with database management system and professional coordination system (e.g., SAP), at the first opportunity, users would effectively exchange ideas, engage in discussion or negotiation, send notifications or coordinate their working headway. Therefore, advanced network devices and corresponding program or systems would effectively reduce the costs spent on communication and negotiation.

Thirdly, compared to free or trial version of professional systems, the paid version would have more up-to-date and advanced features for information and data exchanging, automatic data operation [34]. For example, internet-based SAP [35] is a platform on which users could automatically collect, reorganize and analyze the information and data, effectively execute tasks appointed in the contract, conveniently coordinate and communicate with each other when necessary. Thus, by using such professional systems, it will be more feasible for a supply chain partner to perform real-time interaction and synchronize their working progress. Accordingly, professional systems could reduce the cost incurred by preparing data, communication and coordination.

In general, if a firm uses advanced computers and network devices, and professional program and systems, the costs incurred by preparing data and information, and the costs incurred by communication and coordination would be saved [36]. This implies that, during joint-actions (i.e., relational governance in this study), the firm would have higher communication and coordination efficiency, and the data

and information needed for joint-actions would be easier to access or more abundant. Therefore, based on the high-level communication and coordination, and abundant and well-prepared data and information, the joint-actions between two firms would be more efficient and effective [3,37]. On the other hand, during the design of explicit and contingent contract clauses, highly efficient and effective communication and coordination can create more time and energy for firms to exchange ideas, discuss duties and rights of each party, and consider as many contingencies, situations, and circumstance as possible. More prepared data and information are also able to fill the gaps that both parties ignore. Thus, the analysis, discussion and negotiation about contract clauses could be as thorough as necessary. The explicit clauses will be more specific and comprehensive, and the contingent clauses can cover more unexpected events, situations, and circumstances. In general, the following hypotheses are set forth:

Hypothesis 1 H1. *The advancement of IT infrastructure resources would improve (a) the joint-actions, (b) the design of explicit clauses, and (c) the design of contingent clauses.*

2.2. The Moderating Effects of IT Human Resources

The deployment of IT infrastructure, e.g., SAP, could reduce the agency and transactions cost and improve the network externalities [38]. By such economic mechanism, the firm would improve the efficiency and effectiveness of interfirm relationship management and operations, and of new product development and innovations, which would bring increased competitive advantages for the firm or even shape a new market [39]. However, most of the IT infrastructure resources, especially database management systems and SAP, are not popular program. Users have to take considerable time and effort to learn how to use them effectively in their work. Thus, they need a group of professional people to provide technical guidance and support, i.e., the IT human resources who specialize in IT-related works [31,32], such as computer network administration, software and system maintenance, SAP/ERP development and collaboration platform construction. In other words, IT human resources are the basis or linkage for normal users to use IT infrastructure resources effectively, which would be helpful for firms to develop a new product or even shape a new market.

Specifically, for the normal users who charge supply chain management, the effectiveness of IT human resources is manifested in the technical support that IT personnel provide. In technology acceptance literatures, researchers suggest that the effectiveness of IT infrastructure on firm operations efficiency would be affected by the perceived usefulness and the ease of use of the IT infrastructure [40,41]. Firstly, if IT personnel provide more IT-related education and regularly impart IT knowledge, skills or techniques to the users, they will perceive much more usefulness about computers, network devices and the SAP systems [40]. Thus, the users are more willing to communicate or collaborate with partner by such devices and systems. This implies that the relationship between IT infrastructure resources and joint-actions, and the design of explicit clauses and contingent clauses will be strengthened by effective technical guidance and support of IT personnel.

Secondly, to use computer, network devices and SAP systems effectively, the users need timely professional troubleshoot and guidance (especially for SAP system). If the IT personnel could provide timely and reliable technical guidance and support when users encounter technical problems about computers, network devices and SAP systems, they will deem that the IT devices and software and systems are easy to use [40]. Thus, they will be more willing to communicate and coordinate with partners using computers, network devices and SAP systems, suggesting that the effect of IT infrastructure on joint-actions, on explicit designing and on contingent clauses designing will be strengthened by effective technical guidance and support of IT personnel. Thus, the hypotheses are set forth:

Hypothesis 2 H2. *The technical support of the IT personnel would strengthen the effects of IT infrastructure resources (a) on joint actions, (b) on the design of explicit clauses and (c) on the design of contingent clauses.*

2.3. The Relational and Contractual Governance and Partner's Opportunism

For a common goal, two parties could build a better relationship by working together [22,23]. Specifically, in joint planning, armed with excellent communication and coordination capabilities (enabled by IT resources), the two parties will accurately and efficiently understand each other's requirements and intentions. After the plan is made, it will clarify their respective responsibility, obligations, and rights [42]. Thus, the two parties' future reward and punishment will be clearer and definite than ever [43], which brings future certainty for two parties and helps them construct mutual trust, intimacy, and commitment. Thus the opportunistic behavior would be mitigated. On the other side, if they encounter problems or conflicts during cooperation, effective joint-problem-solving (enabled by IT resources) is the key to unlock the problems or conflicts. That is, in joint-problem-solving, excellent communication and coordination capabilities could save much more time and energy and reduce stress for both parties. In other words, they could spend less energy to extensively discuss the problem or conflict and find out solutions. After the problems or conflicts are resolved, they will build much more mutual trust, intimacy, and commitment, which are critical to mitigating partner's opportunism [44]. Thus, the hypothesis is:

Hypothesis 3a H3a. *The joint-actions would reduce partner's opportunism.*

In contract designing, effective explicit contract clauses would contain as many details as possible and fully reflect the intentions of both parties. Therefore, the two parties will admit their respective responsibility and rights. On the other side, the contingencies are also ensured as far as possible by extensive discussion. By designing the two types of clauses, the two parties will be confident about future cooperation and the corresponding reward. If one party behaves opportunistically, they will fully understand the consequences, e.g., cooperation breaking, punishment and reward losing. Thus, they would have less intention to behave opportunistically. The following hypotheses are set forth:

Hypothesis 3 H3. *Both (b) explicit clauses and (c) contingent clauses would reduce partner's opportunism.*

3. Method

3.1. Data Collection

The data were collected from 216 manufacturers located in Xi'an, Shenyang, Guangzhou, Zhengzhou, and Wuhan, the five important metro areas in China. The descriptive statistics of the industries, ownership, number of employees, and cooperation duration and position tenure of respondent were given in Table 1. The initial sample frame includes 400 manufacturers that were selected randomly from a yellow page of the Chinese manufacturer industry. A relatively wide range of manufacturers was chosen for two reasons. Firstly, IT resources (hardware, software, human capital, etc.), have a great contribution to the organization effectiveness and firm performance in many manufacturing industries and firm ownerships. Secondly, a more diverse sample is apt to increase the generalizability of results.

The respondents of the questionnaire were persons in charge of interfirm relationship management, e.g., marketing channels or supply chain. The respondents were selected by two principles [45]: (1) respondent is knowledgeable about supply chain management or marketing channel management and (2) they should have enough level to be involved in the issues under investigation. In order to assure the data quality, a validation (reversed) item was set to verify that the respondent fills out the questionnaire carefully.

Table 1. Sample descriptive statistics.

Industries	Electronic and electric	33.1%	Number of employees	Below 100	20.3%
	Small appliances	31.4%		100–499	34.6%
	Machinery manufacturing	25.3%		500–999	33.0%
	Food	3.1%	Cooperation duration	Over 1000	12.1%
	Bath products	6.8%		No more than 1 year	11.6%
	Garment	0.3%		1–3 years	21.4%
Ownership	State-owned	20.1%		3–5 years	37.6%
	Joint-venture	22.7%		Over 5 years	29.4%
	Collective-owned	16.9%	Position tenure of respondent	Below 1 year	17.9%
	Private-owned	30.8%		1–3 years	27.1%
	Wholly foreign-owned	9.5%		3–5 years	24.2%
				Over 5 years	30.8%

The survey was conducted in two waves. Firstly, the questionnaires were sent to 200 respondents of manufacturers. When the respondents received the questionnaires, face-to-face instructions on how to complete it were provided. Then, three days later, the questionnaires were collected from the respondents and they were given gifts as a reward. In the first wave, 142 questionnaires were collected. The response rate was 71%. Among the 142 questionnaires, 115 were examined and qualified for this study. Secondly, I uploaded the questionnaires (with instructions) to an online survey website and sent the URL of questionnaires to 200 respondents by email. In order to enhance the response rate, I promised 30 RMB rewards as incentives. After one week, 154 questionnaires were filled out. The response rate was 77%. Among the 154 questionnaires 101 were checked to be qualified. Finally, the total sample size was 216 firms and covered a variety of industries.

In order to assure the nonresponse bias, 20 nonrespondents were chosen from field survey and online survey respectively. They were asked to answer two selected items in the questionnaire: “Overall, our IT employees are knowledgeable when we are in IT related troubles.” and “Our company plans volume demands for the next seasons together with this distributor.”

To test the difference between respondents and nonrespondents, the one-sample t-test was used. The results show no significant difference. Besides, the demographic characteristics and important constructs in the field survey and in the online survey were also compared. The results show no difference. Thus, the two samples were put together.

3.2. Measures

Multi-item scales of five-point were used to reflect the variables of this study (Appendix A) (i.e., “1” indicated “strongly disagree” and “5” indicated “strongly agree”). Specifically, the scales were developed in four steps: (1) Well-established scales were identified by reviewing the related literature. Few items were adjusted according to the context setting of this study and the original meaning was not changed. (2) All the items were translated from English. Then another translator performed the back-translation to ensure the measurement equivalence [46]. (3) Academics and practitioners were asked to review the scales to make sure all the questions were phrased properly. (4) A pilot test using a sample of 20 potential respondents was conducted before launching the large-scale survey, and the scales were modified based on the feedback. The final scales are shown in the Appendix A (Table A1).

The scale of IT infrastructure resources (ITIR) was made of four items. The items follow the studies of Byrd and Turner [47] and Jean et al. [14]. The scale measured the speed and performance of IT devices, the firm-level collaboration systems and the investment in the IT devices and software. The scale of IT human resources (ITHR) had four items. The items were also taken from the studies of Byrd and Turner [47] and Tippins and Sohi [48]. The scale respectively measured the supports that IT employees provide for the users, including the trouble-shooting of IT devices and software, IT knowledge imparting, timely help of IT techniques and technical solutions to the user’s business needs. The scale of joint-actions (JA) had five items, which were adopted from Zhou, Zhang and

Zhuang [23]. The five items measured the joint-actions between the two parties, e.g., make a plan together and solve the problems together. Both of the scales of explicit clauses designing (EC) and contingent clauses designing (CC) had three items respectively, which were adopted from Lusch and Brown [19]. The scale of opportunism (OP) had seven items, which were adopted from Gundlach and Achrol [49]. This scale measured the partner's possible opportunism.

Ideally, the items that measure ITIR and ITHR should be answered by IT personnel who are more professional and knowledgeable about information technology. The partner's opportunism should be measured by objective method that does not have biases, e.g., the financial loss caused by partner's opportunism. However, such operation is quite costly, time-consuming and difficult. Thus, follow the previous studies of [14,50,51], the respondent's subjective perceptions about ITIR and ITHR are used to replace the real level of ITIR and ITHR. Similarly, following the study of [10,23,52,53], the respondent's subjective perceptions about partner's opportunistic behaviors are used to replace the objective level of partner's opportunistic behaviors.

In addition, to clarify incidental sources of variation of partner's opportunism, I included two control variables, sales amount, and cooperation duration. The first control variable, sales amount, was introduced because the sales amount largely reflects the firm size. The large firm always has advantages in brand and market share which may result in lower partner's opportunism. The second is cooperation duration, which was introduced because it may cause the respondent to have biases on the perception of partner's opportunism. For example, a company which has longer cooperation with its partner might encounter more opportunism of the partner. Thus, the respondent would have stronger perception of partner's opportunism. Besides, many previous studies show that there is interplay between relational governance and contract governance [10,54,55]. Thus, the interplay effects between the two governances are also controlled. That is, the relationships between EC, CC, and JA are added.

3.3. Measurement Validation

First, the validity and reliability of the scales of the six variables were examined. Specifically, as to face and content validity, most of the items were used in previous studies. The meanings of each scale could cover the definitions of the constructs well. Moreover, the validities of these scales were accepted by managers. Practitioners deemed that items in every scale were easy to understand and no discrepancy existed in the meaning of items. In general, the face validity and content validity could be ensured by these steps.

The average variance extracted (AVE) of the six constructs were over 0.51 and the standard error of the six constructs were of a low level related to their path estimates (see Table 2). Thus, the convergent validities of the six variables are adequate. [56]. Table 3 provides a synopsis of construct correlations, which demonstrate the discriminant validity of the measures. The square roots of six AVE are over the respective variable correlations. Thus, the discriminant validities of six variables are adequate.

To check the reliability, the Cronbach's alpha is used in this study. Specifically, the measurement model is used to establish all reliability measures. The reliabilities of the six constructs were given in Table 2. The results show the reliabilities of the six constructs are adequate, greater than 0.7 suggested by Gefen et al. [57].

Table 2. Measurement model.

Constructs	Estimates (SE)	AVE	CronbachAlpha	Constructs	Estimates (SE)	AVE	Cronbach Alpha
IT infrastructure resources (ITIR)		0.69	0.85	Explicit clauses designing (EC)		0.59	0.81
ITSP1	0.86 (0.02)			EC1	0.78 (0.04)		
ITSP2	0.84 (0.02)			EC2	0.74 (0.04)		
ITSP3	0.83 (0.02)			EC3	0.79 (0.03)		
ITSP4	0.79 (0.03)			Contingent clauses designing (CC)		0.70	0.87
IT human resources (ITHR)		0.74	0.92	CC1	0.84 (0.02)		
ITPP1	0.83 (0.03)			CC2	0.87 (0.02)		
ITPP2	0.85 (0.02)			CC3	0.80 (0.02)		
ITPP3	0.88 (0.02)			Opportunism (OP)		0.63	0.92
ITPP4	0.88 (0.02)			OP1	0.81 (0.03)		
Joint-actions (JA)		0.51	0.84	OP2	0.84 (0.03)		
JA1	0.75 (0.03)			OP3	0.74 (0.04)		
JA2	0.76 (0.04)			OP4	0.81 (0.03)		
JA3	0.72 (0.04)			OP5	0.81 (0.03)		
JA4	0.63 (0.06)			OP6	0.75 (0.05)		
JA5	0.71 (0.04)			OP7	0.79 (0.03)		

Table 3. Means, standard deviations and intercorrelations.

Constructs	Means	SD	Construct Correlations					
			ITIR	ITHR	JA	EC	CC	OP
ITIR	3.46	0.82	0.83					
ITHR	3.42	0.92	0.68	0.87				
JA	3.45	0.67	0.40	0.46	0.71			
EC	3.82	0.60	0.33	0.39	0.54	0.77		
CC	3.85	0.68	0.39	0.33	0.51	0.56	0.84	
OP	2.80	0.77	−0.01	−0.12	−0.10	−0.26	−0.10	0.79

Notes 1. Correlations between constructs are significant ($p < 0.05$). 2. The diagonal of the matrix is the square root of average variance extracted.

To examine the common method variance (CMV), Harman's single factor method and label variable method were adopted [58]. Specifically, the exploratory and unrotated factor analysis was performed. If CMV was present, a single dominant factor would be revealed. The Harman's single factor examination showed that six factors had more than one eigenvalue, which explained 63.99% of the variance. Among the six factors, the biggest one explained 28.98% of the variance. Thus, CMV was not a serious concern. As the sample had passed the CMV test, I concluded that there was little reason to believe that the sample was open to potential common method variance. Therefore, the structural model proceeded to test the hypotheses in the next section.

4. Analyses and Results

The Smart PLS 2.0 (SmartPLS GmbH, Boenningstedt, Germany) was used to test the hypotheses. The data analyses results were presented in Table 4. Specifically, the proposed model explains 23% variance in joint-actions, 21% variance in explicit contract clauses designing, 61% variance in contingent contract clauses designing, 33% variance in partner's opportunism. The results indicate that the proposed model is appropriate.

Table 4. Structural model results.

Hypothesis (Path)	Hypothesized Model		
	Path Coefficient (SE)	t-Value	R ²
Hypotheses:			
ITIR→JA (H1a)	0.23 (0.06)	3.78	0.23
ITIR × ITHR→JA (H2a)	0.19 (0.09)	2.11	
ITIR→EC (H1b)	0.34 (0.08)	4.30	0.21
ITIR × ITHR→EC (H2b)	0.19 (0.08)	2.36	
ITIR→CC (H1c)	0.23 (0.07)	3.22	0.61
ITIR×ITHR→CC (H2c)	0.23 (0.08)	2.87	
JA→OP (H3a)	−0.27 (0.06)	4.47	0.33
EC→OP (H3b)	0.07 (0.11)	0.65	
CC→OP (H3c)	−0.33 (0.05)	6.55	
Control variables:			
Sales amount→OP	0.08 (0.07)	1.14	
Cooperation duration→OP	−0.50 (0.07)	7.14	
Sales amount→JA	0.02 (0.07)	0.29	
Cooperation duration→JA	0.25 (0.06)	4.17	
Sales amount→EC	0.01 (0.07)	0.10	
Cooperation duration→EC	−0.34 (0.07)	4.86	
Sales amount→CC	−0.02 (0.06)	0.33	
Cooperation duration→CC	0.40 (0.06)	6.67	
EC→JA	0.37 (0.05)	7.40	
CC→JA	0.15 (0.06)	2.52	
EC→CC	0.13 (0.07)	1.82	

Notes: path estimates are standardized; standard error are estimated using a bootstrap procedure.

Table 5 shows that eight of the nine hypotheses are supported by the data. Specifically, as I anticipated, IT infrastructure resources have positive influences on joint-actions ($\gamma = 0.23$, SE = 0.06), on explicit clauses designing ($\gamma = 0.34$, SE = 0.08) and on contingent clauses designing ($\gamma = 0.23$, SE = 0.07). Hence, the entire H1 is supported. Similarly, IT human resources have positively moderated the effects of IT infrastructure resources on joint-actions ($\gamma = 0.19$, SE = 0.09), on the explicit clauses designing ($\gamma = 0.19$, SE = 0.08) and on contingent clauses designing ($\gamma = 0.23$, SE = 0.08). Therefore, the entire H2 is supported. The results show that joint-actions ($\gamma = -0.27$, SE = 0.06) and contingent clauses designing ($\gamma = -0.33$, SE = 0.05) have negative influences on partner opportunism. Thus, H3a and H3c are supported. H3b predicts that explicit clauses designing have negative influence on partner's opportunism. However, such influence is not supported by the data ($\gamma = 0.07$, SE = 0.11). Thus, H3b is rejected.

Table 5. Hypotheses testing results.

Hypothesis	Results
H1a: The advancement of IT infrastructure resources would improve the joint-actions.	Passed
H1b: The advancement of IT infrastructure resources would improve explicit clauses designing.	Passed
H1c: The advancement of IT infrastructure resources would improve contingent clauses designing.	Passed
H2a: The technical support of the IT personnel would strengthen the effects of IT infrastructure resources on joint-actions.	Passed
H2b: The technical support of the IT personnel would strengthen the effects of IT infrastructure resources on explicit clauses designing.	Passed
H2c: The technical support of the IT personnel would strengthen the effects of IT infrastructure resources on contingent clauses designing.	Passed
H3a: The joint-actions would reduce partner's opportunism.	Passed
H3b: The design of explicit clauses would reduce partner's opportunism.	Not Passed
H3c: The design of contingent clauses would reduce partner's opportunism.	Passed

5. Discussion and Conclusions

5.1. Main Findings

Based on transaction and agency cost perspective, literature of information systems, and B2B governance, this study investigates how IT resources influence the two governances and partner's opportunism in green supply chain. Eight of the nine hypotheses are supported by the data collected in China. I found that the IT resources, including IT hardware and IT software (or systems) and IT personnel, are able to improve the relational and contractual governance in the supply chain management, and thus, to mitigate partner's opportunism. In general, the results support the conclusions of Lioukas, Reuer and Zollo [59], that IT could benefit the whole strategic alliances.

Firstly, advanced and fast IT devices and professional software (or systems), as I predicted, could improve the joint-actions by improving the communication and coordination between firms. Such a finding is similar to Lee and Scott [37] and Chang et al. [3], both of which suggest that IT infrastructure resources could improve joint-actions between two parties. Similarly, I find that advanced and fast IT infrastructure resources could enhance both the design of the explicit clauses and the contingent clauses by improving the communication and coordination between firms on the green supply chain. In general, such findings are similar to the results of Banker, Kalvenes and Patterson [60] and Krishna, Parlapalem and Dani [34]. They all confirm the improvement of IT infrastructure to the dyadic contract-related activities, such as contract development, control and monitor.

Secondly, the three direct influences of IT infrastructure resources on joint-actions, on explicit clauses designing and on contingent clauses designing are positively moderated by the technical support of IT personnel. To the best of my knowledge, this finding details how IT personnel can be a "value-adding" resource mentioned in Liu, Chen, Bose, Hu and Bruton [61]. Specifically, most of previous studies investigate the effect of IT human resources separately, e.g., Bharadwaj [31], Huang, Ou, Chen and Lin [62] and Ravichandran and Lertwongsatien [63]. Few studies investigate the synergistic effects between IT infrastructure resources (i.e., IT hardware, software, and systems), IT human resources and organizational resources, e.g., Chen [64] and Teo and Ranganathan [65]. However, they did not discuss the different role of the two IT resources. In this study, I argue that IT infrastructure resource is a predictor and IT human resource is a moderator. Finally, effective joint-actions could decrease the partner's opportunism effectively, as many previous studies demonstrated [66,67]. Although, many previous studies confirm that formal (or explicit) contract is able to reduce partner's

opportunism [5,68], they did not investigate the effect of contingent clauses separately. Interestingly, in this study, I found that explicit contract clause designing is ineffective while contingent clause designing is effective. As the data were collected from Chinese firms, the Chinese culture and market environment would influence the effects of explicit contract clauses. Specifically, Chinese culture value the relationship (or Guanxi) in B2B cooperation. Thus, Chinese firms would like to simultaneously adopt both relational and contractual governance in B2B cooperation. Notably, Chinese firms would not tend to design the contract too explicitly, because overly explicit contract clauses may imply distrust and thus, undermine the root of relational governance. Besides, in recent years, Chinese firms have faced more unpredictability and uncertainty in a more dynamic market. Therefore, the previously signed clauses may become invalid or infeasible when the contract is executed. Thus, Chinese firms would also tend not to design overly explicit contract clauses and would consider much more contingent clauses to cover as many unexpected events as possible. Such results extend the contractual governance literatures to some extent.

5.2. Theoretical Contributions

This study has several important theoretical implications. Specifically, in information systems and supply chain management literatures, abundant studies investigate the effect of IT on the integration, coordination or collaboration side of B2B relationship. Few studies investigate how IT affects the control or governance side and its consequences, such as Jean et al. [14]. Comparatively, this study finds IT infrastructure resources have a direct and positive influence on the two governances and mitigate partner's opportunism, which extends the information systems and supply chain management literatures that focus on B2B relationship management.

Secondly, this study also finds the moderating effect of IT human resources on the positive influences of IT infrastructure resources on two governance mechanisms. Although few previous studies examine the interaction between IT infrastructure resources and IT human resources, e.g., Chen [64] and Teo and Ranganathan [65], they did not distinguish the different roles of the two types of IT resources. Thus, this study also improves the studies that focus on the different IT resources interactions.

Thirdly, in B2B studies, the effects of relations (or Guanxi) and formal contract on partner's opportunism have been extensively examined [10–12,55]. However, no studies investigate the influences of IT resources in enabling governance mechanism and mitigating partner's opportunism. Thus, this study extends the antecedents of relational and contractual governance, which would enrich the governance-opportunism literatures. Thus, this study also extends the contract-opportunism researches.

5.3. Managerial Implications

Efficiency and effectiveness mean a great deal to the green supply chain management and to firm competitive advantages and performance. Compared to previous studies that suggest managerial wisdom about integration, coordination or collaboration in B2B relationship management, the findings of this study will suggest control or governance side of green supply chain management.

Specifically, if a firm wants to improve its relational governance, purchasing more advanced IT hardware or a higher version of professional software or systems would be helpful. This is because IT would improve the communication and coordination between firms, which could improve the joint planning and joint problem solving, the two important joint-actions in relational governance. Based on effective joint planning and joint problem solving, mutual trust, commitment and intimacy between firms of the green supply chain would be formed more easily. Accordingly, the partner will have less intention to behave opportunistically.

Secondly, using advanced IT hardware and professional software or systems, a firm can also improve the contract governance. Specifically, purchasing advanced IT hardware and professional software would be helpful for strengthening communication and coordination between firms, which

could improve the efficiency and effectiveness of the design of explicit and contingent clauses. In particular, the contingent clauses would be more effective in mitigating partner's opportunism.

Thirdly, if the firm wants to amplify the positive effect of IT hardware and professional software or systems, the firm could ask for more effective technical support from IT personnel, such as troubleshooting, regular training, technique instruction. This is because the more support IT personnel provide for the users, the more likely the users are to experience usefulness and ease of use. Thus, they would be more willing to adopt IT hardware and software in their interaction with their partners, especially if the firm has limited investment in new IT hardware and software or systems, strengthening IT personnel's support is a more effective method.

5.4. Limitations and Future Directions

I have tried my best to improve this study, although limitations still existed. Firstly, in the survey, the supply chain or marketing channel manager were chosen to be respondent. However, most of them were not computer science major (or related major). Therefore, in order to let respondents understand the intention easily, I had to choose simply and perceived-type questions when it came to IT infrastructure performance and IT personnel technical assistance or instructions. Thus, the IT resources measurement might have subjective divergence problem. An ideal method is to design more objective and professional questions about IT infrastructure and IT technical support and invite the respondents from IT related department to answer them respectively. In addition, the partner's opportunism was also measured by perceived-type questions, which would have subjective divergence problem. Thus, in future studies, objective measurement, e.g., the loss caused by partner's opportunism, could be used. Secondly, in methodology, cross-sectional data were adopted. However, this kind of data was inefficient to validate the casual relationship between constructs because of its congenital deficiency. An ideal method is longitudinal study. That is, data of several years should be more capable of demonstrating the effect of IT resources on channel power.

The results of this study also suggest several gaps for supply chain management. First, in this study, the influences of environmental factors were not considered, such as market uncertainty and legal enforcement. In future studies, how environmental factors affect the IT resources and governance mechanism are worthy of studying. Secondly, power (or dependence) is another important factor that affects B2B relationships. In future researches, how IT resources affect the power (or dependence) will be an interesting question. Thirdly, only the partner's opportunism is considered as the result of IT resources and two governance mechanisms. In a future study, other outcomes, such as satisfaction and financial performance, could be investigated.

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Appendix A

Table A1. Measurement scales.

IT Infrastructure Resources (ITIR)	
ITIR1	Our company uses the most advanced IT devices.
ITIR2	Every year, our company invests heavily in new IT devices (e.g., desktops, laptops, servers, routers, internet connections, etc.).
ITIR3	We have latest released professional software and enterprise systems (ERP, SAP, Lotus Notes).
ITIR4	In our company, software systems are always upgrading timely.

Table A1. Cont.

IT Infrastructure Resources (ITIR)	
IT human resources (ITHR)	
ITHR1	Overall, our IT employees are knowledgeable when we are in IT-related troubles.
ITHR2	Our IT employees are very capable in training others.
ITHR3	Our IT employees are able to interpret business problems and develop appropriate technical solutions.
ITHR4	Our IT employees are good at maintaining computers and network
Joint-actions (JA)	
JA1	Our company plans volume demands for the next seasons together with this distributor.
JA2	Our company jointly plans the new product demands for the next seasons with this distributor.
JA3	Our company plans the variety demands for the next seasons together with this distributor.
JA4	This distributor and our company jointly deal with problems that arise in the course of relationship together.
JA5	In most aspects of the relationship with this distributor, the responsibility for getting things done is shared.
Explicit clauses designing (EC)	
EC1	In dealing with our major distributor, we have clauses that precisely define the role of each party.
EC2	In dealing with our major distributor, we have clauses that precisely define the responsibilities of each party.
EC3	In dealing with our major distributor, we have clauses that precisely state how each party is to perform.
Contingent clauses designing (CC)	
CC1	In dealing with our major distributor, we have clauses that precisely state what will happen in the case of events occurring that were not planned.
CC2	In dealing with our major distributor, we have clauses that precisely state how disagreements will be resolved.
CC3	In dealing with our major distributor, we have clauses that precisely state how the unexpected problem should be dealt with.
Partner's opportunism (OP)	
OP1	The distributor exaggerated needs to get what they desired.
OP2	The distributor was not always sincere.
OP3	The distributor altered facts to get what they wanted.
OP4	Good faith bargaining was not a hallmark of the distributor's negotiation style.
OP5	The distributor provided a completely truthful picture when negotiating. (reversed item)
OP6	The distributor breached formal or informal agreements to their benefit.
OP7	The distributor always makes us take extra duties.

References

- Kim, D.; Cavusgil, S.T.; Cavusgil, E. Does IT alignment between supply chain partners enhance customer value creation? An empirical investigation. *Ind. Mark. Manag.* **2013**, *42*, 880–889. [\[CrossRef\]](#)
- Wang, E.T.G.; Chou, F.K.Y.; Lee, N.C.A.; Lai, S.Z. Can intrafirm IT skills benefit interfirm integration and performance? *Inf. Manag.* **2014**, *51*, 924–938. [\[CrossRef\]](#)
- Chang, K.-H.; Chen, Y.-R.; Huang, H.-F. Information technology and partnership dynamic capabilities in international subcontracting relationships. *Int. Bus. Rev.* **2015**, *24*, 276–286. [\[CrossRef\]](#)
- Luo, Y. Opportunism in Inter-firm Exchanges in Emerging Markets. *Manag. Organ. Rev.* **2006**, *2*, 121–147. [\[CrossRef\]](#)
- Cavusgil, S.T.; Deligonul, S.; Chun, Z. Curbing Foreign Distributor Opportunism: An Examination of Trust, Contracts, and the Legal Environment in International Channel Relationships. *J. Int. Mark.* **2004**, *12*, 7–27. [\[CrossRef\]](#)
- Jap, S.D.; Anderson, E. Safeguarding Interorganizational Performance and Continuity under Ex Post Opportunism. *Manag. Sci.* **2003**, *49*, 1684–1701. [\[CrossRef\]](#)
- Wathne, K.H.; Heide, J.B. Opportunism in Interfirm Relationships: Forms, Outcomes, and Solutions. *J. Mark.* **2000**, *64*, 36–51. [\[CrossRef\]](#)
- Deverell, R.; McDonnell, K.; Devlin, G. The Impact of Field Size on the Environment and Energy Crop Production Efficiency for a Sustainable Indigenous Bioenergy Supply Chain in the Republic of Ireland. *Sustainability* **2009**, *1*, 994–1011. [\[CrossRef\]](#)
- Chiu, J.; Hsieh, C. The Impact of Restaurants' Green Supply Chain Practices on Firm Performance. *Sustainability* **2016**, *8*, 42. [\[CrossRef\]](#)

10. Zhou, K.Z.; Xu, D. How foreign firms curtail local supplier opportunism in China: Detailed contracts, centralized control, and relational governance. *J. Int. Bus. Study* **2012**, *43*, 677–692. [CrossRef]
11. Zhou, K.Z.; Poppo, L.; Yang, Z. Relational ties or customized contracts? An examination of alternative governance choices in China. *J. Int. Bus. Stud.* **2008**, *39*, 526–534. [CrossRef]
12. Zhou, K.Z.; Poppo, L. Exchange hazards, relational reliability, and contracts in China: The contingent role of legal enforceability. *J. Int. Bus. Stud.* **2010**, *41*, 861–881. [CrossRef]
13. Liu, Y.; Li, Y.; Shi, L.H.; Liu, T. Knowledge transfer in buyer-supplier relationships: The role of transactional and relational governance mechanisms. *J. Bus. Res.* **2017**, *78*, 285–293. [CrossRef]
14. Jean, R.-J.B.; Sinkovics, R.R.; Cavusgil, S.T. Enhancing international customer-supplier relationships through IT resources: A study of Taiwanese electronics suppliers. *J. Int. Bus. Stud.* **2010**, *41*, 1218–1239. [CrossRef]
15. Spralls, S.A.; Hunt, S.D.; Wilcox, J.B. Extranet Use and Building Relationship Capital in Interfirm Distribution Networks: The Role of Extranet Capability. *J. Retail.* **2011**, *87*, 59–74. [CrossRef]
16. Lu, Y.; Zhao, C.; Xu, L.; Shen, L. Dual Institutional Pressures, Sustainable Supply Chain Practice and Performance Outcome. *Sustainability* **2018**, *10*, 3247. [CrossRef]
17. Poppo, L.; Zenger, T. Do formal contracts and relational governance function as substitutes or complements? *Strateg. Manag. J.* **2002**, *23*, 707–725. [CrossRef]
18. Gencturk, E.F.; Aulakh, P.S. Norms- and Control-Based Governance of International Manufacturer-Distributor Relational Exchanges. *J. Int. Mark.* **2007**, *15*, 92–126. [CrossRef]
19. Lusch, R.F.; Brown, J.R. Interdependency, Contracting, and Relational Behavior in Marketing Channels. *J. Mark.* **1996**, *60*, 19–38. [CrossRef]
20. Stephen, A.T.; Coote, L.V. Interfirm behavior and goal alignment in relational exchanges. *J. Bus. Res.* **2007**, *60*, 285–295. [CrossRef]
21. Cannon, J.P.; Achrol, R.S.; Gundlach, G.T. Contracts, Norms, and Plural Form Governance. *J. Acad. Mark. Sci.* **2000**, *28*, 180–194. [CrossRef]
22. Zhuang, G.; Xi, Y.; Tsang, A.S.L. Power, conflict, and cooperation: The impact of guanxi in Chinese marketing channels. *Ind. Mark. Manag.* **2010**, *39*, 137–149. [CrossRef]
23. Zhou, Y.; Zhang, X.; Zhuang, G.; Zhou, N. Relational norms and collaborative activities: Roles in reducing opportunism in marketing channels. *Ind. Mark. Manag.* **2015**, *46*, 147–159. [CrossRef]
24. Reuer, J.J.; Ariño, A. Strategic alliance contracts: Dimensions and determinants of contractual complexity. *Strateg. Manag. J.* **2007**, *28*, 313–330. [CrossRef]
25. Hart, O.; Moore, J. Foundations of Incomplete Contracts. *Rev. Econ. Stud.* **1999**, *66*, 115–138. [CrossRef]
26. Clemons, E.K.; Row, M.C. Limits to Interfirm Coordination through Information Technology: Results of a Field Study in Consumer Packaged Goods Distribution. *J. Manag. Inf. Syst.* **1993**, *10*, 73–96. [CrossRef]
27. Sinkovics, R.R.; Jean, R.-J.; Roath, A.S.; Cavusgil, S.T. Does IT Integration Really Enhance Supplier Responsiveness in Global Supply Chains? *Manag. Int. Rev.* **2011**, *51*, 193–212. [CrossRef]
28. Boulay, J. The role of contract, information systems and norms in the governance of franchise systems. *Int. J. Retail Distrib. Manag.* **2010**, *38*, 662–676. [CrossRef]
29. Kim, S.M.; Mahoney, J.T. Mutual commitment to support exchange: Relation-specific IT system as a substitute for managerial hierarchy. *Strateg. Manag. J.* **2006**, *27*, 401–423. [CrossRef]
30. Subramani, M. How do suppliers benefit from information technology use in supply chain relationships? *MIS Q.* **2004**, *28*, 45–73. [CrossRef]
31. Bharadwaj, A.S. A Resource-Based Perspective on Information Technology Capability and Firm Performance: An Empirical Investigation. *MIS Q.* **2000**, *24*, 169–196. [CrossRef]
32. Melville, N.; Kraemer, K.; Gurbaxani, V. Information technology and organizational performance: An integrative model of IT business value. *MIS Q.* **2004**, *28*, 283–322. [CrossRef]
33. Chen, Y.; Wang, Y.; Nevo, S.; Benitez-Amado, J.; Kou, G. IT capabilities and product innovation performance: The roles of corporate entrepreneurship and competitive intensity. *Inf. Manag.* **2015**, *52*, 643–657. [CrossRef]
34. Krishna, P.R.; Karlapalem, K.; Dani, A.R. From Contracts to E-Contracts: Modeling and Enactment. *Inf. Technol. Manag.* **2005**, *6*, 363–387. [CrossRef]
35. SAP. Supplier Management. Available online: <https://www.sap.com/products/e-procurement/supplier-management.html> (accessed on 14 November 2018).

36. Paulraj, A.; Lado, A.A.; Chen, I.J. Inter-organizational communication as a relational competency: Antecedents and performance outcomes in collaborative buyer–supplier relationships. *J. Oper. Manag.* **2008**, *26*, 45–64. [[CrossRef](#)]
37. Lee, M.T.; Scott, K. Leveraging IT resources, embeddedness, and dependence: A supplier’s perspective on appropriating benefits with powerful buyers. *Inf. Manag.* **2015**, *52*, 909–924. [[CrossRef](#)]
38. Erkut, B. What Did SAP Change? A Market Shaping Analysis. *Mark. Branding Res.* **2018**, *5*, 51–63. [[CrossRef](#)]
39. Erkut, B. The Emergence of the ERP Software Market between Product Innovation and Market Shaping. *J. Open Innov. Technol. Mark. Complex.* **2018**, *4*, 23. [[CrossRef](#)]
40. Venkatesh, V.; Morris, M.G.; Davis, G.B.; Davis, F.D. User Acceptance of Information Technology: Toward a Unified View. *MIS Q.* **2003**, *27*, 425–478. [[CrossRef](#)]
41. Legris, P.; Ingham, J.; Colletette, P. Why do people use information technology? A critical review of the technology acceptance model. *Inf. Manag.* **2003**, *40*, 191–204. [[CrossRef](#)]
42. Metcalf, L.E.; Frear, C.R.; Krishnan, R. Buyer-Seller Relationships: An Application of the IMP Interaction Model. *Eur. J. Mark.* **1992**, *26*, 27–46. [[CrossRef](#)]
43. Joshi, A.W.; Campbell, A.J. Effect of environmental dynamism on relational governance in manufacture-supplier relationships: A contingency framework and an empirical test. *J. Acad. Mark. Sci.* **2003**, *31*, 176–188. [[CrossRef](#)]
44. Brown, J.R.; Dev, C.S.; Lee, D.J. Managing Marketing Channel Opportunism: The Efficacy of Alternative Governance Mechanisms. *J. Mark.* **2000**, *64*, 51–65. [[CrossRef](#)]
45. Campbell, D.T. The Informant in Quantitative Research. *Am. J. Sociol.* **1955**, *60*, 339–342. [[CrossRef](#)]
46. Sekaran, U. Methodological and Theoretical Issues and Advancements in Cross-Cultural Research. *J. Int. Bus. Stud.* **1983**, *14*, 61–73. [[CrossRef](#)]
47. Byrd, T.A.; Turner, D.E. Measuring the flexibility of information technology infrastructure: Exploratory analysis of a construct. *J. Manag. Inf. Syst.* **2000**, *17*, 167–208.
48. Tippins, M.J.; Sohi, R.S. IT Competency and Firm Performance: Is Organizational Learning a Missing Link? *Strateg. Manag. J.* **2003**, *24*, 745–761. [[CrossRef](#)]
49. Gundlach, G.T.; Achrol, R.S.; Mentzer, J.T. The Structure of Commitment in Exchange. *J. Mark.* **1995**, *59*, 78–92. [[CrossRef](#)]
50. Zhang, T.; Wang, X.; Zhuang, G. Building channel power: The role of IT resources and information management capability. *J. Bus. Ind. Mark.* **2017**, *32*, 1217–1227. [[CrossRef](#)]
51. Rai, A.; Tang, X. Leveraging IT Capabilities and Competitive Process Capabilities for the Management of Interorganizational Relationship Portfolios. *Inf. Syst. Res.* **2010**, *21*, 516–542. [[CrossRef](#)]
52. Liu, Y.; Su, C.T.; Li, Y.; Liu, T. Managing opportunism in a developing interfirm relationship: The interrelationship of calculative and loyalty commitment. *Ind. Mark. Manag.* **2009**, *39*, 844–852. [[CrossRef](#)]
53. Lai, F.; Tian, Y.; Huo, B. Relational governance and opportunism in logistics outsourcing relationships: Empirical evidence from China. *Int. J. Prod. Res.* **2011**, *50*, 2501–2514. [[CrossRef](#)]
54. Yang, Z.; Zhou, C.; Jiang, L. When do formal control and trust matter? A context-based analysis of the effects on marketing channel relationships in China. *Ind. Mark. Manag.* **2011**, *40*, 86–96. [[CrossRef](#)]
55. Li, J.J.; Poppo, L.; Zhou, K.Z. Relational mechanisms, formal contracts, and local knowledge acquisition by international subsidiaries. *Strateg. Manag. J.* **2010**, *31*, 349–370. [[CrossRef](#)]
56. Arnett, D.B.; Laverie, D.A.; Meiers, A. Developing parsimonious retailer equity indexes using partial least squares analysis: A method and applications. *J. Retail.* **2003**, *79*, 161–170. [[CrossRef](#)]
57. Gefen, D.; Straub, D.W.; Boudreau, M.C. Structural Equation Modeling And Regression: Guidelines for Research Practice. *Commun. Assoc. Inf. Syst.* **2000**, *4*, 1–77. [[CrossRef](#)]
58. Podsakoff, P.M.; MacKenzie, S.B.; Lee, J.Y.Y.; Podsakoff, N.P. Common Method Bias in Behavioral Research: A Critical Review of the Literature and Recommended Remedies. *J. Appl. Psychol.* **2003**, *88*, 879–903. [[CrossRef](#)]
59. Lioukas, C.S.; Reuer, J.J.; Zollo, M. Effects of Information Technology Capabilities on Strategic Alliances: Implications for the Resource-Based View. *J. Manag. Stud.* **2016**, *53*, 161–183. [[CrossRef](#)]
60. Banker, R.D.; Kalvenes, J.; Patterson, R.A. Information Technology, Contract Completeness, and Buyer-Supplier Relationships. *Inf. Syst. Res.* **2006**, *17*, 218–228. [[CrossRef](#)]
61. Liu, L.; Chen, D.Q.; Bose, I.; Hu, N.; Bruton, G.D. Core versus peripheral information technology employees and their impact on firm performance. *Decis. Support Syst.* **2013**, *55*, 186–193. [[CrossRef](#)]

62. Huang, S.M.; Ou, C.S.; Chen, C.M.; Lin, B.S. An empirical study of relationship between IT investment and firm performance: A resource-based perspective. *Eur. J. Oper. Res.* **2006**, *173*, 984–999. [[CrossRef](#)]
63. Ravichandran, T.; Lertwongsatien, C. Effect of Information Systems Resources and Capabilities on Firm Performance: A Resource-Based Perspective. *J. Manag. Inf. Syst.* **2005**, *21*, 237–276. [[CrossRef](#)]
64. Chen, J.L. The synergistic effects of IT-enabled resources on organizational capabilities and firm performance. *Inf. Manag.* **2012**, *49*, 142–150. [[CrossRef](#)]
65. Teo, T.S.H.; Ranganathan, C. Leveraging IT resources and capabilities at the housing and development board. *J. Strateg. Inf. Syst.* **2003**, *12*, 229–249. [[CrossRef](#)]
66. Grzeskowiak, S.; Al-Khatib, J.A. Does morality explain opportunism in marketing channel negotiations?: The moderating role of trust. *Int. J. Retail Distrib. Manag.* **2009**, *37*, 142–160. [[CrossRef](#)]
67. Liu, Y.; Luo, Y.; Liu, T. Governing buyer-supplier relationships through transactional and relational mechanisms: Evidence from China. *J. Oper. Manag.* **2009**, *27*, 294–309. [[CrossRef](#)]
68. Wuyts, S.; Geyskens, I. The Formation of Buyer-Supplier Relationships: Detailed Contract Drafting and Close Partner Selection. *J. Mark.* **2005**, *69*, 103–117. [[CrossRef](#)]



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