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Trust, Information Integration, and Coordination Costs: An Integrative Model

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Abstract

Our research develops an integrative model of trust, information integration and performance implications. A study of 398 Chinese firms shows that goodwill trust affects information sharing, while competence trust affects both information sharing and joint planning. Information sharing reduces coordination costs and increases supplier performance; joint planning increases both coordination costs and supplier performance. Finally, coordination costs reduce supplier performance.

Keywords: *Trust, Information Integration, Coordination Costs*

Introduction

Researchers have long advocated that information integration is critical to the success of supply chain management (Kulp et al., 2004; Mohr and Nevin, 1990; Mohr and Spekman, 1994; Monczka et al., 1998). The various information integration practices can be broadly classified into two groups: information sharing and collaboration (Kulp et al., 2004). To gain competitive advantages, supply chain partners often initiate or are forced to engage in different levels of integration of market information and coordination of activities. Information integration thus becomes a designable variable in supply chain members' strategic decisions. Nevertheless, practitioners and researchers are frequently confronted by two interrelated issues: what are the main driving forces facilitating information integration and what are its consequences?

Research addressing the above-mentioned issues has resulted in fruitful outcomes. In recent years, researchers have made substantial efforts to identify the factors that affect companies' selection of various collaborative interfirm control and governance mechanisms, including information integration. While extant studies come up with various determinants, trust has been advocated by many as a major factor that affectsintegration effects. For example, researchers from both the school of transaction cost economies (TCE) and the social perspective have recognized and even emphasized the significance of trust in interfirm control and governance including information integration (e.g., Das and Tseng 1998, 2001). On the other side, numerous studies have explored the benefits of information sharing and collaboration between supply chain partners such as manufacturers and retailers. These studies generally agree that both information sharing and collaboration activities have positive impacts on supply chain outcome, yet the relative effects depend upon various conditions (e.g., Kulp et al 2004). Following the two streams of research inquiries, a question naturally arising is: How do the two streams work together? Specifically, does trust really matter? If so, how does trust influence supply chain performance? What are the performance implications of information integration? Addressing these questions demands an integrative approach to examine the three aspects simultaneously. Yet, little effort is devoted to integrating the linkage from trust, information integration, and firm performance.

Within the broad, integrative model, we further examine two under-researched questions which are critical to our main research domain. The first pertains to the relationships between trust and information integration. Prior studies on the relationship between trust and interorganizational governance mainly focus on differentiating interorganiztional trust (also called institutional trust) from interpersonal trust (e.g., Zaheer, McEvily and Perrone 1998, Nooteboom, Berger and Noorderhaven 1997). This line of research assumes that interorganizational trust has a homogeneous influence on interfirm governance. Yet, studies on organizational trust have long pointed out that at least two distinct types of trust, i.e., goodwill and competence, exist, and the working mechanism of each type of trust on organization outcomes may differ vastly (Das and Teng, 1998; Lui and Ngo, 2004). Importantly, effectiveness of information integration is not only affected by the extent to which two parties are willing to cooperate with each other, but are also determined by their capability to carry on integration initiatives. As such, Sako (1992, p.43) emphasizes that "competence trust is a prerequisite for the viability of any repeated transaction". To compensate prior studies' sole focus either on goodwill trust or on competence

trust, we intend to empirically examine how goodwill and competence trust influence information integration simultaneously.

Our second focus is related to the performance implications of information integration. While investigating the outcomes of information integration, prior studies often focus on the downstream side of the supply chain (manufacturers and retailers), and thus utilize profit as a main indicator of performance. For the upstream side of the supply chain (supplier and manufacturers and retailers), researchers mainly focus on the relationship between integration and supplier performance (e.g., Mohr and Spekman, 1994; Monczka et al., 1998). While we agree that supplier performance, especially profits, are ideal indicators of supply chain success, broad measures are indeed needed to reflect the complicated nature of a supply chain, since not all activities are measurable in terms of dollar value and profit by no means is the only consideration. Specifically, we introduce coordination costs, a concept which refers to the costs related to the coordination of business transactions, as one of the important performance implications. We argue that, as a major component of transaction cost[1], coordination costs are essential in evaluating the effectiveness of information integration. A company should examine not only the benefits of such integration on supplier performance, but also its effects on coordination costs. Accordingly, it is desirable to study the linkages between information integration and supplier performance and coordination costs *simultaneously*. By comparing the magnitudes of these two linkages, one can obtain a complete picture of how information integration affects the supply chain outcomes.

In the succeeding sections of this paper, we present our research hypotheses, research methodology, and findings. These are followed by a discussion of implications of the findings, as well as limitations and future research directions.

The Integrative Model

In this section, we discuss the concepts of information sharing and joint planning, as well as goodwill trust and competence trust. We posit that both types of trust influence information sharing and joint planning, which subsequently affect coordination cost and supplier performance. Our research model is presented in Figure 1.

Information Integration

As we mentioned earlier, information integration can be categorized into two broad categories which we identify as information sharing and joint planning. Information sharing refers to the exchange of critical, often propriety, information between supply chain members, through media such as face-to-face meetings, telephone, fax, mail, and the Internet (Mohr and Spekman, 1994). Joint planning refers to collaboration of trading partners on scheduling and developing various aspects of their business relationship, such as new product development, inventory replenishment, marketing efforts, etc. Future contingencies and consequential duties and responsibilities in a

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[1] Here we adopt Heide's (1994) definition of transaction cost, which conceptualizes transaction cost in terms of coordination costs and opportunity costs.

relationship could also be made explicitly *ex ante* during such a process (Claro et al., 2003).

Information Sharing

It is argued that various types of information need to be exchanged in order for supply chain members to effectively coordinate with each other (Kulp et al., 2004; Monczka et al., 1998). Such information may include, but is not limited to, inventory and replenishment-related information, consumer research, financial status, growing ability, overhead cost structure, production capacity, and technology and propriety information (Kulp et al., 2004; Monczka et al., 1998; Noordewier et al., 1990; Uzzi, 1997). Furthermore, to sustain a successful partnership, such information sharing also needs to be frequent, bidirectional, informal, and non-coercive (Mohr et al., 1996; Mohr and Nevin, 1990; Mohr and Spekman, 1994). As a governance mechanism, information sharing enables buyers and suppliers to transmit persuasive messages, foster participative decision making, coordinate programs, and exercise desired power efforts (Mohr and Nevin 1990). In turn, this can enhance relationship building and facilitate cooperative relationships.

Joint Planning

Companies employ joint planning to coordinate various activities between them, for example, inventory control, design and development of new products, forecasting, and product promotion (Claro et al., 2003; Kulp et al., 2004; Mohr and Spekman, 1994; Monczka et al., 1998). Previous studies commonly report that collaborative joint actions are positively related to supply outcomes (Kulp et al., 2004; Mohr and Spekman, 1994; Monczka et al., 1998). Moreover, joint planning may serve as a governance mechanism in a buyer-supplier relationship (Noordewier et al., 1990; Randfleisch and Heide, 1997). It allows mutual expectations to be previously established and details of transactions and joint actions to be specified at the outset (Claro et al., 2003). Furthermore, it provides one party an opportunity to monitor the other party's business plan, thus preventing potential opportunistic behaviors that may be embedded in such plans (Heide and John, 1990). Moreover, joint planning allows two parties to interact with each other, thus potential errors of their business plans can be identified, discussed, and resolved.

Trust and Information Integration

In this study, we differentiate two dimensions of trust: goodwill trust and competence trust (Das and Teng, 1998; Lui and Ngo, 2004). Goodwill trust is defined as the belief of one party that the other party will perform a particular action important to the trustor, irrespective of the ability to control and monitor that other party (Jap and Anderson, 2003; Mayer et al., 1995). Competence trust refers to the expectation of one party that the other party has the ability to fulfill its expected role in the relationship (Das and Teng, 2001; Lui and Ngo, 2004). Importantly, among the two forms of trust, goodwill trust mainly serves as a safeguard against opportunistic behaviors in the relationship (Lui and Ngo, 2004). Competence trust works in different ways. It increases one party's confidence in the other's ability; thus, this party believes that the other party could make critical decisions correctly without

intervention and support from it. Due to such differences, these two types of trust play a different role in forming information sharing and joint planning.

The Effects of Goodwill Trust.

The information exchanged between two parties can be regarded as transaction specific assets dedicated to the relationship (Choudhury and Sampler, 1997; Uzzi, 1997). Transaction specific assets are those human and physical assets dedicated by a company to a particular relationship, which involve sunk cost that would be unrecoverable if the relationship is terminated (Grover and Malhotra, 2003; Heide and John, 1992). TCA suggests that such assets could be exploited by trading partners' opportunistic behaviors, such as lying, cheating, or violation of agreements (Randfleisch and Heide, 1997). Thus, safeguards of such assets are required. Following the same logic, providing critical information could make one party potentially vulnerable to the opportunistic behaviors of the other party. However, when goodwill trust is present, trading partners are confident that each other will utilize the information received from the other party faithfully. As such, goodwill trust mitigates the inherent information asymmetry between trading partners by allowing more open and honest information sharing (McEvily and Marcus, 2005; Zaheer et al., 1998). In this sense, goodwill trust enables extensive information sharing between two parties and serves as a safeguard of such information. Therefore:

H1: Goodwill trust is positively related to information sharing.

The role of goodwill trust in joint planning is primarily preventive. During the joint planning process, the organizational boundary is penetrated when party A is involved in the decision making process which is traditionally regarded as party B's responsibility (Heide and John, 1990), for example, forecasting, new product development, and so forth. As such, B relinquishes some of its controls on decision making to A. This opens doors to opportunistic behaviors by party A. Hence, control relinquishment naturally requires certain protections against opportunism; additionally, safeguards such as goodwill trust are desirable. Companies will feel comfortable in participating in joint planning when such trust is present. Moreover, unforeseen contingencies may arise during the joint planning process. In this case, agreement could be reached more quickly and easily with a high level of goodwill trust, since the trust allows two parties to be more flexible in granting concession, with the expectation that the other party will pay back the favor in the future (Zaheer et al., 1998).

Nevertheless, goodwill trust does not enhance the effectiveness of joint planning. Essentially, such trust delineates one firm's intention to make things work, but not its ability to accomplish that objective (Das and Teng, 2001). If one party, for example, does not possess the necessary capability to accomplish its assignment during the joint planning process, joint planning may fail to produce satisfactory results despite the goodwill of two parties. In sum, goodwill trust does not ensure the success of such planning. It primarily serves as a safeguard mechanism for opportunistic behaviors during the process of joint planning. As such, it may or may not exert significant influence on joint planning. To test the effect of goodwill trust, we offer a non-directional hypothesis positing that:

H2: Goodwill trust is related to joint planning.

The Effects Of Competence Trust.

Besides risks related to opportunistic behaviors on both parties, there are also performance risks related to both information sharing and joint planning. Performance risks are probabilities that objectives of a buyer-supplier relationship are not achieved, despite satisfactory cooperation between them (Das and Teng, 2001). Notably, one party will be reluctant to share information or conduct joint planning with another party if it perceives that such information integration cannot achieve its intended purposes. For example, if party A lacks resources and capabilities to fully understand and absorb the information received from party B, or is unable to provide significant input during the joint planning process, party B may feel that it is worthless to conduct such communication activities with A. As noted above, the information provided to the other party, as well as time, effort, and knowledge devoted to joint planning, could be regarded as transaction specific investments (Choudhury and Sampler, 1997; Heide and John, 1990). One company will be reluctant to commit such investments if it feels that its investments will not pay off. In other words, perception of potential performance risks could reduce trading partners' motivation to conduct both information sharing and joint planning. As noted by Das and Teng (2001), for one party, competence trust on the other party mitigates its concerns on performance risks, because it gives this party a sense of confidence that the other party is capable of accomplishing a given task. As such, competence trust enhances both information sharing and joint planning. Therefore:

H3a: Competence trust has a positive effect on joint planning.
H3b: Competence trust has a positive effect on information sharing.

Information Integration and Coordination Costs

Coordination costs pertain to the expense that stems from the needs for acquiring and maintaining satisfactory supplier performance. Such expenses include administrative costs, costs of monitoring supplier performance, and costs of coordinating and communicating with the supplier (Cannon and Homburg, 2001; Heide, 1994; Noordewier et al., 1990). The effects of information sharing and joint planning on coordination costs remain unclear in previous studies.

On the one hand, both information sharing and joint planning involve various costs. Information sharing requires information to be collected, organized, transmitted, and analyzed on both sides, and thus incurs administrative costs as well as communication costs. Joint planning occurs when employees from both buyer and supplier sides meet either personally or virtually via communication channels such as video conferencing and the internet. Accordingly, inputs such as time, resource, and knowledge are required for the meeting. In this sense, both information sharing and joint planning increase coordination costs.

On the other hand, information sharing and joint planning allow both parties to effectively monitor each other's performance and interact with each other. This is especially the case if two parties regularly conduct joint planning and/or share extensive information or policy.Under these circumstances, a routine will be

established for such communication. Thus, the communication between two companies can be easily handled, and will thus result in low coordination cost. In contrast, without open information sharing and regular joint planning, communicating complex and variable data or information between two parties may involve substantial costs. For example, if the buyer needs to know information about the supplier's investments on a new technology and such information has never been exchanged between two parties before, the supplier may have some difficulty in understanding what exactly the buyer wants to know. Furthermore, it takes times for the buyer to determine whether it is safe to provide such sensitive information. If it decides to provide the information, additional time and resources are also required to collect and organize the information. In other words, without the policy and routine established by conducting open information sharing and joint planning, it will be costly for companies to exchange complex and/or sensitive information between them. Furthermore, without open information sharing and joint planning, it will become costly for one party to monitor the other party's performance. This party needs to pass judgment on the other party's performance based on limited information available. Such analysis may require substantial time and intelligent input from its purchasing professionals. It may also turn to third parties, such as credit investigation firms, to obtain information of the other party. Overall coordination cost will increase tremendously in this case. In this sense, information sharing and joint planning may also reduce coordination cost. Given the foregoing discussion, we offer non-directional hypotheses, as follows:

> **H4a:** Information sharing is related to coordination cost.
> **H4b:** Joint planning is related to coordination cost.

Information Integration and Supplier Performance

Prior studies have shown that both information sharing and joint planning enhance supplier's performance. It is suggested that extensive information sharing could improve communication quality, enhance trading partners' commitment and coordination, share knowledge of process and alternative, and contribute to supplier development activities (Carr and Pearson, 1999; Krause, 1999; Mohr and Nevin, 1990; Monczka et al., 1998), thus positively impacting supplier performance. As for joint planning, such planning allows mutual expectations to be established and cooperative efforts to be specified (Mohr and Spekman, 1994). Thus, with extensive joint planning, coordination between two parties is likely to be more effective and companies may obtain various benefits such as improved profit margin, lower inventory cost, lower cost of purchased items, improved product quality, reduced cycle time, and better access to new product or process technologies (Kulp et al., 2004; Monczka et al., 1998). Therefore, it is hypothesized that:

> **H5a:** Information sharing is positively related to supplier's performance.
> **H5b:** Joint planning is positively related to supplier's performance.

Buyer's Coordination Cost and Supplier Performance

TCA maintains that the efficiency and performance of an exchange dyad are greatly affected by the parties' ability to limit transaction related costs, such as coordination cost (Zaheer et al., 1998). While the coordination costs examined in this paper are

incurred on the buyer side, such costs could also have negative effects on the supplier's performance. As mentioned above, we define buyer's coordination costs as expenses such as administrative costs, cost of monitoring supplier performance, and costs of coordinating and communicating with the supplier. The high level of such costs indicates difficulty of coordination between two parties. Essentially, the expensive and ineffective coordination could distract both two parties from their business and subsequently impair the supplier's performance (Zaheer et al., 1998). Therefore, it is hypothesized that:

H6: Buyer's coordination cost is negatively related to the supplier's performance.

Method

Sample and Data Collection

To test our predictions we examined buyer-supplier relationships in the context of manufacturing firms located in China. A sample of 1,200 firms was randomly selected from a sampling frame consisting of a list of all manufacturing firms belonging to the four-digit Chinese Industrial Classification (CIC) codes 1311 ~ 4290, which are similar to Standard Industrial Classification codes. These firms spanned diversified industries (e.g., electronics, computer equipment, chemicals, transportation equipment, apparel, furniture, food, and plastics), which may increase the external validity of the findings (Gatignon and Xuereb 1997). In each firm, a senior manager or a purchasing professional, who is directly involved in the procurement process, was selected as the key informant in the research.

Pursuing suggestions from Hoskisson et al. (2000), we collaborated with a marketing investigation firm to conduct the study, in an endeavor to obtain reliable information relating to emerging economies. Informants were initially contacted by telephone, in an attempt to solicit their cooperation. Among the 1,200 firms selected as target samples, the potential informants of 117 firms could not be reached, and 663 declined to cooperate. The remaining 420 firms agreed to participate in the research and were successfully interviewed on-site by employees of the investigation firm, who administered the questionnaire. In the ensuing process, the informants were initially requested to select one major supplier with whom the company did the largest volume of business, and then to respond to the survey questions concerning their exchanges with the chosen supplier. After eliminating surveys with excessive missing data and lower levels of confidence, we obtained 398 completed responses, representing an effective response rate of 33.2% (398 out of 1200 firms).

Testing non-response bias. The researchers compared the respondent companies with those who declined to participate, as well as those who could not be reached, in terms of their key characteristics (i.e., industry type, firm ownership, location, the number of employees, and annual sales revenues) through a series of Chi-square tests and ANOVA tests. No statistically significant differences between these groups surfaced. Therefore, the representativeness of the sample was deemed to be adequate.

The 398 firms in the final sample represent the major industrial groups in the manufacturing sector, including industrial and commercial machinery (20.5%),

electronic and other electrical equipment and components (12.2%), chemicals and allied products (11.2%), computer equipment (8.3%), food and kindred products (5.8%), rubber and miscellaneous plastics products (4.3%), fabricated metal products (4.0%), apparel and other finished products made from fabrics and similar materials (3.6%), printing, publishing and allied industries (3.6%), textile (3.6%), and others (22.9%).Among them, 52% of the respondent companies possessed a work force of less than 160 employees; 41%, from 160 to 1000; and 7%, more than 1000. Regarding annual sales revenue, 38% reported less than 25 million RMB (Chinese currency); 39%, between 25 million and 100 million; 12%, between 100 and 300 million; and 11%, more than 300 million.

Measures

All of the measures used in the survey, which embodied multiple items, were adapted from established studies. Two researchers translated all of the measures with back translation processes to ensure conceptual equivalence (Hoskisson et al. 2000). The initially-developed questionnaire was reviewed by three academicians whose fields related to supply chain management. Based on their feedback, we removed items that were not deemed to be relevant to the domains of their designated constructs, and modified the wording of some items. Further, we developed new items based on the suggestions that the reviewers offered.In addition, we conducted a pilot study through administration of the questionnaire to 50 purchasing professionals from various manufacturing firms in Shanghai, China. These companies were randomly selected from the database held by the investigation firm. The respondents were requested to respond to the questionnaire items and also provide feedback regarding the design and wording of the questionnaire. Additional revisions were undertaken, based on the pilot study results. The source and the scale items appear in the Appendix.

Common Method Assessment

Common method variance may exist when one respondent provides answers to all the variables (Podsakoff & Organ, 1986). To assess whether such a condition exists, we randomly selected 37 firms and interview the second informants. We compared their response with those of the first informant. No significant difference is detected for major constructs and performance measure.

Validation of Measurement

The adequacy of the multi-item scales in capturing their constructs is assessed using confirmatory models, which are tested on the full dataset by using the Maximum Likelihood approach of EQS 6.1 program (Bentler, 1995).The initial confirmatory model test results in acceptable model fit: the Chi-square value with 194 degree of freedom is 580 (P=0.00; Ratio of chi-square to the degrees of freedom= 3.0), NFI=0.92; NNFI= 0.93; CFI=0.94, IFI=0.95, and RMSEA=0.071. However, one item, Gtrust4, has an unacceptably large variance of measurement error (1.8). Thus, the item is deleted from the measurement model. The revised model is tested again. The analysis results show excellent model fit: the Chi-square value with 174 degree of freedom is 513 (P=0.00; Ratio of chi-square to the degrees of freedom= 2.9), NFI=0.93; NNFI= 0.94; CFI=0.95, IFI=0.95, and RMSEA=0.070.

As shown in the Table 1, all the items have a large, significant loading (>0.7) on their designated constructs. In addition, the composite reliability and Cronbach's Alpha of all these constructs are larger than 0.7. Thus the reliability of these constructs is considered adequate (Nunnally, 1978). Moreover, to evaluate the convergent validity, we compute average variance extracted (AVE) for each of the constructs. As presented in Table 1, all the AVEs exceed the recommended minimum level of 0.5, indicating the convergent validity of the constructs (Fornell and Larcker, 1981). To test discriminant validity of the constructs, we compare the amount of shared variance of any two constructs with the AVEs of the constructs. The result of this test shows that the AVE of each construct is larger than shared variances between all pairs of factors in the model, indicating a satisfactory level of discriminant validity (Fornell and Larcker, 1981). The means, standard deviations, and correlations of the constructs are presented in Table 2.

Table 1: Standardized factor loadings, Cronbach's Alpha, Composite reliability, and AVEs for the measurement model

Construct	Indicator	Loading	Composite reliability	Cronbach's Alpha	AVE[1]
Goodwill trust	Gtrust1	0.84	0.84	0.88	0.63
	Gtrust2	0.87			
	Gtrust3	0.83			
Competence trust	Ctrust1	0.83	0.73	0.83	0.57
	Ctrust2	0.85			
Information sharing	Ishare1	0.83	0.90	0.92	0.63
	Ishare2	0.82			
	Ishare3	0.80			
	Ishare4	0.87			
	Ishare5	0.88			
Joint planning	Jplan1	0.90	0.73	0.93	0.57
	Jplan2	0.94			
	Jplan3	0.88			
Supplier performance	Sperf1	0.85	0.92	0.92	0.73
	Sperf2	0.85			
	Sperf3	0.86			
	Sperf4	0.78			
	Sperf5	0.81			
Coordination costs	Ccost1	0.87	0.85	0.90	0.66
	Ccost2	0.90			
	Ccost3	0.83			

Note: AVE: Average variance extracted

Table 2. Means, standard deviations, and correlations of the constructs

	Mean	Standard Deviation	Ctrust	Gtrust	Ishare	Jaction	Sperf	Ccost
Competence Trust (Ctrust)	4.62	1.24	1					
Goodwill	5.14	1.09	.553(**)	1				

Trust (Gtrust)								
Information Sharing (Ishare)	4.82	1.26	.596(**)	.719(**)	1			
Joint Action (Jaction)	4.21	1.42	.632(**)	.393(**)	.482(**)	1		
Supplier Performance (Sperf)	4.95	.94	.444(**)	.608(**)	.565(**)	.452(**)	1	
Coordination Costs (Ccost)	3.40	1.13	-.106(*)	-.318(**)	-.173(**)	.004	-.314(**)	1

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Data Analysis and Results

We test our hypotheses by using Maximum likelihood procedure of the EQS (Bentler, 1995). The fit indices indicate satisfactory model fit: Chi square with 175 degree of freedom= 565 (P=0.00; Ratio of Chi-square to degree of freedom =3.2), NFI=0.92; NNFI= 0.93; CFI=0.94, IFI=0.94, and RMSEA=0.075. Our results, as shown in the Figure 1, support all of these hypotheses except H2.
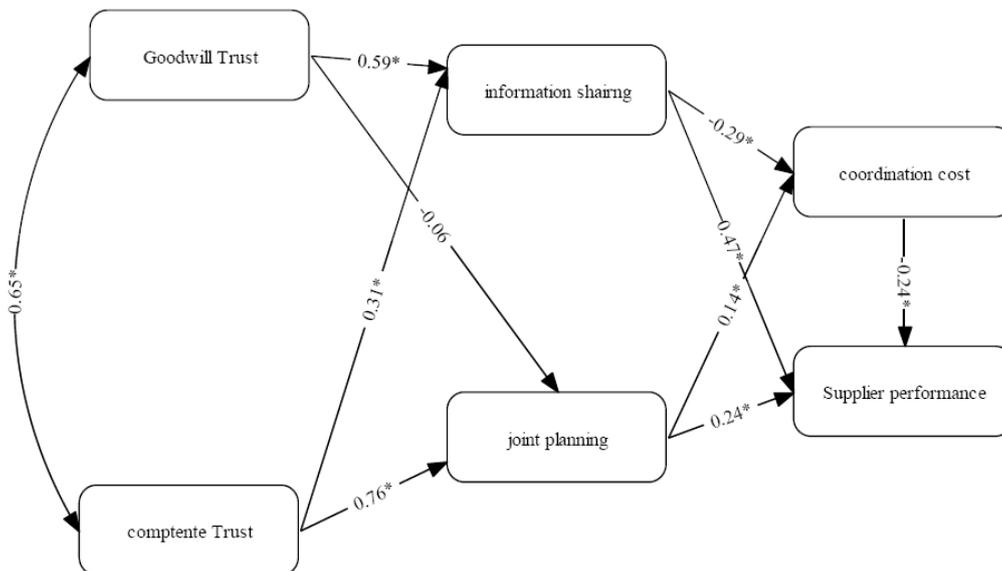
Figure 1: Structural equation modeling results
Note: * indicates significant path

Goodwill trust is found significantly and positively related to information sharing, but not to joint action. Thus Hypothesis 1 is supported while Hypothesis 2 is rejected. Competence trust is found to have positive effects on both information sharing and joint action, thus Hypotheses 3a and 3b are supported. Our analysis reveals that information sharinghas negative impact on coordination costs, while joint action has positive effects on the cost. Thus Hypotheses 4a and 4b are supported. Both information sharing and joint planning are found to have a significant, positive impact on supplier performance. Thus, Hypotheses 5a and 5b are supported. The finding that

coordination costs have a significant, negative effect on supplier performance lends support to Hypothesis 6.

Discussion

Theoretical and Managerial Implications

Our research develops an integrative model of trust, information integration and performance implications. The simultaneous tests address some essential theoretical issues in a supply chain and have important practical implications.

First, our empirical examination confirms the prominent role of two forms of trust in forming information sharing and joint planning, which in turn, influence two main forms of supply chain outcomes. The linkages suggest that trust serves as a prerequisite for information integration, and information works as a facilitator in enhancing the performance of a supply chain.

Our second theoretical contribution lies in the finding of the distinct mechanisms of two forms of trust in facilitating information integration. Specifically, as expected, goodwill trust primarily serves as a safeguard mechanism for opportunistic behaviors and significantly increases information sharing between suppliers and buyers. Goodwill trust, nevertheless, has *no* significant impact on joint planning which is primarily determined by competence trust. Competence trust is a significant driver for both information sharing and joint planning; but it has much greater influence on joint planning than on information sharing. The findings imply that it is necessary and meaningful to decompose interorganizational trust as two forms. In practice, our results suggest that when making strategic decisions on information integration, companies should ideally use the two kinds of trust as design variables to achieve optimal levels of integration. A benevolent and competent partner is an ideal candidate for leverage information/knowledge sharing and collaboration of activities. When the highest levels of both goodwill and competence trust are not simultaneously feasible, managers could choose a partner possessing the right kind of trust that is most suitable to the type of integration. The findings also provide directions for designing partner qualification programs in which the selection of partners should consider the appropriate match between two forms of trust (goodwill and competence trust) and two broad categories of information integration (information sharing and joint planning).

The last important contribution is related to the performance implications of information integration. Consistent with previous studies, we find that information integration has a positive effect on supplier performance. Contrasted to the findings of Kulp et al (2004) to the effect that collaboration between manufacturers and retailers contributes more to profit margin than mere information sharing does, our results indicate that information sharing, in the aggregate, has a more influential effect on supplier performance than joint planning has. The main reason lies in the notion that information sharing significantly reduces coordination costs which, in turn, are detrimental to supplier performance. In contrast, joint planning significantly increases coordination costs. Thus, including transaction costs as a performance implication enables us to obtain a clear picture of the consequences of information integration. Practically, managers should carefully design the degree of information sharing and

joint planning. Specifically, information sharing reduces coordination costs; further, its formation is constrained by partners' goodwill trust and competence trust. On the other hand, joint planning, facilitated by competence trust, enhances supplier performance, but also increases coordination costs. Thus, designing appropriate levels of information integration should take into account (1) the levels of partners' goodwill and competence trust and (2) the trade-off between coordination costs and supplier performance.

Limitations and Further Research Directions

There are two major limitations in our research which also provide directions for further studies. Our study only examines the constraints of information integration from the social perspective. Future research may explore the driving forces of information integration from both social and TCE perspectives, embracing such TCE constructs as specific investments and market uncertainty.

We use a composite index representing both information sharing and joint planning which is not unusual in the extant literature (Mohr,1990, 1995; Heide 19940). Further studies could further decompose both constructs into various components and examine their individual effects. For instance, information sharing could be sub-divided into information sharing on market demand, new product development, inventories, and operational capabilities.

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Appendix. The Questionnaire items

Goodwill trust (adopted from (Zaheer et al., 1998))
Gtrust1   This supplier is trustworthy.

Gtrust2   This supplier has always been evenhanded in its negotiations with us.

Gtrust3   This supplier never uses opportunities that arise to profit at our expense.

Gtrust4*   We are not hesitant to transact with this supplier when the specifications are vague.

Competence trust (new scale developed based on (Lewicki and Bunker, 1996; Maguire et al., 2001))

Ctrust1   The parties feel comfortable to let the other party make decisions.

Ctrust2   The parties can effectively do things for each other

Information sharing (adopted from (Heide and John, 1992))

Ishare1   In this relationship, it is expected that any information that might help the other party will be provided to them.

Ishare2   It is expected that the parties will provide proprietary information if it can help the other party

Ishare3   It is expected that we keep each other informed about events or changes that may affect the other party.

Ishare4   The parties regularly exchange information of supply and demand forecast.

Ishare5   The two parties exchange information frequently with each other

Joint planning (adapted from (Heide and John, 1992))

This supplier and our company make joint effort in
   Jaction1   Long-range planning for product development
   Jaction2   Forecasting customers' changing demands
   Jaction3   Testing market acceptance of new products

Coordination costs (adopted from Cannon and Homburg (2001)) (costs are much lower, costs are the same, costs are much higher)

How do each of the following costs related to this supplier compare with the costs incurred in your firm's other supplier relationships?
Ccost1: Costs of monitoring supplier performance
Ccost2: Cost of coordination and communication with this supplier
Ccost3: Administrative costs

Supplier's performance (adopted from Cannon and Perreault (1999)) (poor performance/superior performance)
Please evaluate the supplier's performance on the basis of the following criteria :
Sperf1: Product quality
Sperf2:Delivery performance
Sperf3: Sales, service, and/or technical support
Sperf4: Cost control
Sperf5: Total values received
Note: All the measures use seven-point Likert-type scales.
      *Item is dropped during confirmatory factor analysis.