The Impact of Relationship Commitment on Supply Chain Integration and Company Performance

Baofeng Huo[1*], Xiande Zhao[2]
School of Management, Xi'an Jiaotong University, China
1 Centre for Supply Chain Management & Logistics, Li & Fung Institute of Supply Chain Management & Logistics
The Chinese University of Hong Kong, Shatin, N.T., Hong Kong
2 Department of Decision Sciences and Managerial Economics
Faculty of Business Administration, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong
[*]EMAIL: baofenghuo@gmail.com

Abstract: Supply chain integration (SCI) has received increasing attention from academic researchers and practitioners in recent years. However, our knowledge of what influences SCI, and how SCI influences company performance, is still very limited. This research is an effort to remedy that deficiency by empirically examining two types of relationship commitment (RC), and their impacts on SCI and performance from both supplier and customer sides, based on the data collected from 617 manufacturing companies in China. The results reveal that normative RC has a significant impact on integration and performance, while instrumental RC has no significant impact on either integration or performance. It is also found that integration improves operational performance, which in turn leads to financial performance. However, integration cannot enhance financial performance directly.

Keywords: Supply Chain Integration, Performance, Relationship Commitment, China

I. Introduction

Global competition and escalating customer expectations have forced manufacturing companies to focus more and more on the speed and dependability of delivery and flexibility to meet the changing customer requirements (Davis et al., 2003). Many companies have implemented SCI to enhance their capabilities in delivery and flexibility (Bowersox *et al.,* 1999). Extensive literature has cited the importance of SCI for achieving competitive advantages (Bowersox and Morash, 1989; Lee and Billington, 1992; Morris and Calantone, 1991) as well as for enhancing operational performance (Ahmad and Schroeder, 2001; Frohlich and Westbrook, 2001; Johnson, 1999; Narasimhan and Jayaram, 1998; Stank et al., 2001a).

Although researchers and practitioners have realized the importance of SCI, our understanding of what enables or influences SCI is still very limited. Morgan and Hunt's (1994) commitment-trust theory suggests that trust and relationship commitment (RC) are crucial in the establishment of a long-term relationship and that RC leads to the cooperation between the partners. Relationships commitment is the important factor that influences inter-firm collaborations. However, our knowledge points to the fact that there are no solid empirical studies that investigate the relationship between RC, SCI, and the performance of the manufacturer within the supply chain.

The critical role of the supply chain in meeting market changes and the potential benefits of integrating the supply chain cannot be ignored (Narasimhan and Kim, 2002). Full potential can be realized only if the inter-relationships among the different parts of the supply chain are recognized and proper alignment is ensured between the design and execution of the company's competitive strategy (Stevens, 1989).

Previous research has shown that SCI with suppliers/customers is very important for achieving superior company performance. However, much of the previous work regarding SCI is U.S.-oriented and has not identified a comprehensive model for SCI. There is a need for further research to investigate the relationships between the factors that influence SCI, the degree of SCI, and the performance of the manufacturers within the supply chain in a different context.

In this study, we aim to investigate the relationship between RC and the degree of integration between a manufacturer and its major customers and suppliers within the supply chain. We will also examine the impact of RC and SCI on the performance of the manufacturer. Specifically, our objectives are:

(1) To develop and test the measurement instruments for RC, SCI, and performance of the manufacturer within the supply chains.
(2) To propose and empirically test a model that represents the relationships among RC, SCI, and company performance.
(3) To compare the different roles of two types of RC for both customers' and suppliers' sides.
(4) To offer guidelines for practicing managers to enhance their performance through SCI and better management of relationships with their customers/suppliers.

This study is organized as follows. We will first address the theoretical background of the study with a conceptual model and then the associated hypotheses are proposed. This will be followed by the research methodology, analyses, and results. Finally, we will summarize the major findings and

present the conclusions and the limitations of the study.

II. Theoretical Background and Proposed Hypotheses

2.1. SCI and its influencing factors

SCI refers to "the degree to which an organization strategically collaborates with its supply chain (SC) partners and manages intra- and inter-organization processes to achieve effective and efficient flows of products, services, information, money and decisions, with the objective of providing maximum value to its customers." Zhao et al. (2008, p. 374).

External integration refers to the degree to which a firm can create a partnership with its key supply chain members (customers and suppliers) to structure their inter-organizational strategies, practices, procedures, and behaviors into collaborative, synchronized, and manageable processes to fulfill their customers' requirements (Stank et al., 2001b). External integration can be divided further into customer integration and supplier integration. Customer integration involves the core competency derived from a better coordination of critical customers in a company's supply chain to achieve improved service capabilities at a lower total supply chain cost, whereas supplier integration involves that of critical suppliers (Bowersox *et al*., 1999).

Though various studies examined the role of SCI in improving performance, few studies investigated the drivers of SCI. As suggested by social exchange theory (SET), RC is highly influenced by trust and it is directly related to cooperation (Morgan and Hunt, 1994). Therefore, it is becoming a promising area of research in SCI literature.

2.2. Relationship commitment

RC can be defined as the willingness of a party to invest resources into a relationship (Dion et al., 1992; Morgan and Hunt, 1994). Two types of RC named normative RC and instrumental RC were identified in the paper of Brown *et al.* (1995). Normative RC can be defined as the willingness to secure the relationship due to its identification with and emotional attachment to the goals and values of another party (Morgan and Hunt, 1994; Wetzels *et al*., 1998). Instrumental RC is driven by extrinsic rewards or punishment. For the meanings of different types of RC, normative RC is similar to affective RC (Mathieu and Zajac, 1990; Morgan and Hunt, 1994; Penley and Gould, 1988; Wetzels et al., 1998) and instrumental RC is similar to calculative RC (Geyskens et al., 1996; Mathieu and Zajac, 1990; Penley and Gould, 1988).

2.3. Impacts of RC on SCI

Because SCI is created by cooperative, mutually beneficial partnerships with supply chain members (Wisner and Tan, 2000), RC thus plays a very important role in SCI. Morgan and Hunt (1994) generalized that trust and commitment engender cooperation between the trading partners. RC positively influences acquiescence and cooperation but negatively influences propensity to leave in the retailer and distributor relationships. Beth *et al*. (2003) advocated that trust and RC are placed in the highest priorities in achieving "supply chain integration", a significant concept that promotes collaboration between supply chain partners for values and competitiveness. The integrative activities are usually devastated by the absence of trust and commitment (Sako, 1992). With RC, suppliers/customers become integrated into their key manufacturers' business processes and more tied to the established goals (Chen and Paulaj, 2004b).

To further understand the role of RC in improving SCI, we adopt TCT and SET to explain the mechanism of normative and instrumental RC in improving SCI. If the manufacturer normatively commits to the customer/supplier, they will want to operate their companies like the customer/supplier, look upon the supplier/customer as an important "team member", rather than another common supplier/customer, and maintain good cooperation with them. Supplier/customer integration is achieved this way. Therefore, a normative RC can improve the extent of customer/supplier integration.

In comparison with normative RC's emphasis on norms and values, instrumental RC's perception is mainly based on the calculation of benefits and costs in the transactions. Instrumental RC can also enhance the companies' investment in the relationship which, in turn, improves its integration with the partners in a supply chain, but its impact of supplier/customer integration will be much lower. Therefore, we propose the following research hypotheses (Figure 1):

H1a/b: Normative RC to the supplier/customer by the manufacturer will have a significant positive impact on the degree of integration between the manufacturer and the supplier/customer.

H2a/b: Instrumental RC to the supplier/customer by the manufacturer will have a significant positive impact on the degree of integration between the manufacturer and the supplier/customer.

H3a/b: Normative RC to the supplier/customer by the manufacturer will have a much stronger impact on the degree of integration between the manufacturer and the supplier/customer than instrumental RC.

2.4. Impacts of RC and SCI on performance

When there is a higher level of normative RC, the manufacturer identifies and internalizes with the value and norms of the supplier/customer. Therefore, these two parties have congruency in their values, management philosophies, and norms of behaviors. This will lead to better cooperation between the two parties and reduce the chances of conflicts. As a result, normative RC will enhance the operational performance of the manufacturer. Instrumental RC also pushes the manufacturer to invest in the relationship with the supplier/customer, leading to better operational

performance. However, when the RC is instrumental, the two parties do not share the same values and norms of behaviors and hence, they are looking for short-term rewards. The result of the cooperation will be less close, and there will be higher chances of conflicts. Therefore, instrumental RC may not have a strong relationship with the manufacturer's performance. Thus, we propose the following hypotheses:

H4a/b: Normative RC to the supplier/customer by the manufacturer will have a significant positive impact on supplier/customer-oriented performance.

H5a/b: Instrumental RC to the supplier/customer by the manufacturer will have a significant positive impact on supplier/customer-oriented performance.

H6a/b: Normative RC to the supplier/customer by the manufacturer will have a much stronger impact on supplier/customer-oriented performance than instrumental RC.

Process integration between suppliers/customers and manufacturers helps simplify the procedures between the two organizations and synchronize operations and activities at the boundary. As a result, the manufacturers will have faster and more dependable delivery service. Furthermore, information sharing and coordination of activities between the two organizations will also enhance the manufacturer's ability to quickly introduce new products or modify existing products to meet customers' needs. In addition, the manufacturer can also respond more quickly to the changes in the demand volume and the mix of products needed in the marketplace. Therefore, we propose the following hypothesis:

H7a/b: The extent of supplier/customer integration will have a significant positive impact on supplier/customer-oriented performance.

Through long-term strategic cooperation with the suppliers and customers, the manufacturers can save their time, people and money that are used to write contracts, to control distrust behaviors. Through information sharing between manufacturers and suppliers/customers and working together, they may communicate easily to avoid mistakes in advance and to understand the transaction processes between them. As a result, errors and opportunistic behaviors are reduced. Sometimes, this contributes to financial benefit directly because the costs for error correction and opportunistic behaviors control are saved. When suppliers' and customers' activities are integrated with manufacturers' operation, the manufacturers will reduce delivery time and wasters which lead to high market performance and financial benefits. These integration activities should improve manufacturers' financial performance directly. Therefore, we propose the following hypothesis:

H8a/b: The extent of supplier/customer integration will have a significant positive impact on the manufacturer's financial performance.

It is also obvious that operational performance has a positive influence on the financial performance of the firm. If manufacturers have a good operational performance in terms of delivery, flexibility, customer service, and the like, they will meet the requirements of customers on time and flexibly. The satisfactory customers will buy more products from the manufacturer or bring new customers. As a result, the sales of the manufacturer are enhanced, the market share is improved, and good financial performance is achieved. In order to examine the importance of manufacturers' operational performance in improving the company's financial performance empirically, we test the following hypothesis:

H9a/b: Supplier/customer-oriented performance has a significant positive impact on the financial performance of the manufacturer.

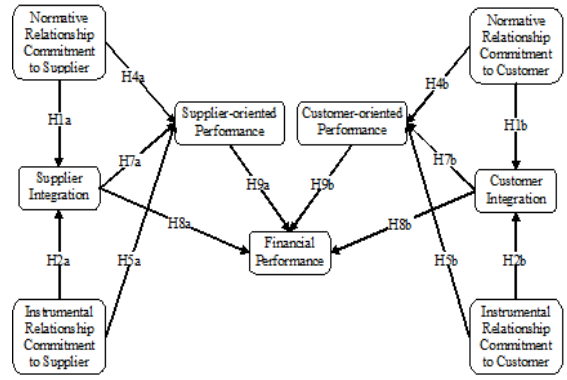


Figure 1. Conceptual model

III. Research methodology

To test the above hypotheses, we collected data from manufacturing companies in China. We used random sampling to collect the data. Because China is a large country, we strategically selected five cities with different economic development stages representing the whole economy of China - Chongqing, Tianjin, Guangzhou, Shanghai, and Hong Kong—as our target samples. To obtain a representative sample of manufacturing companies, we used the Yellow Pages of China Telecom in each of the four selected cities in mainland China and the Directory of the Chinese Manufacturers Association in Hong Kong as the sampling pool to get a representative sample of manufacturing companies. We pilot-tested the questionnaire using a sample of 15 companies. Out of 4569 companies contacted, a total of 1356 questionnaires were sent out and 617 returned questionnaires were usable. The response rate based on the number of companies contacted via telephone is 13.5% and 45.5% based on the number of questionnaire sent out.

The measurement items for RC were adopted from Brown *et al.* (1995). The measurement items for supplier/customer integration were selected from the items used by Narasimhan and Kim (2002) as well as Frohlich and Westbrook (2001). Customer-oriented performance and supplier-oriented performance were measured by six items

modified from several previous studies such as those of Beamo (1999), Frohlick and Westbrook (2001), and Stank et al. (2001b). Financial performance was measured by items of "firm performance" in Narasimhan and Kim (2002).

IV. Analyses and results

4.1. Respondent profiles

The respondents represent a variety of companies from a variety of industries. Over 32% of the responding companies have annual sales of less than HK$5 million, and 14.99% of the respondents have annual sales of HK$100 million or more. More than a quarter (25.49%) of the companies are from the metal, mechanical, and engineering industry, followed by 17.86% in the textiles and apparel industry, and 13.15% in the electronics and electrical industry. There is no significant difference in the SCI among the companies from different industries. We also tested the difference of two types of RC of the companies from different industries. The results of the ANOVA revealed that there is no significant difference between manufacturers' two types of RC to both suppliers and customers, indicating that industry is not a differentiator of RC. Thus, we can combine all the industries together to investigate the issues about SCI and RC.

4.2. Measurement development

To ensure the reliability and validity of the measurements for each construct, we conducted a comprehensive check of validity and reliability of the various constructs used in this study. A rigorous instrument development process is used to develop and validate the instruments to ensure content validity, uni-dimensionality, reliability, convergent, discriminant, and criterion-related validity. This procedure is adopted from previous empirical studies in the logistics and SCM areas (Chen and Paulraj, 2004a; Dunn et al., 1994; Garver and Mentzer, 1999; Min and Mentzer, 2004). Prior to data collection, the content validity of the instruments was established by existing literature and pilot tests. After the data collection, we performed a series of analyses to test the reliability and validity of the constructs and the measurement instruments.

4.2.1. Uni-dimensionality and reliability

The final results of the factor analyses for RC, integration, and performance constructs are shown in Tables 1 and 2. From the tables, we can see that all the measurement items have large loadings on the construct that they are supposed to measure and a much lower loading on the construct that they are not supposed to measure. This indicates the uni-dimensionality of the constructs. The Cronbach alpha values of the constructs are shown in Table 3. The alpha values of all the constructs are above 0.80, except for the two instrumental RC with constructs of 0.667 and 0.694 which are still above the lower limit of 0.60 as suggested by Flynn *et al.* (1990) and Nunnally (1994) for newly developed scales. Although these scales were initially developed by Brown *et al.* (1995), they had previously been applied only in western countries. Thus, we applied the criterion for newly developed scales in China and found that our measurements are unidimensional and reliable.

4.2.2. Convergent and discriminant validity

In the convergent validity test, we construct a CFA model using the LISREL program (O'Leary-Kelly and Vokurka, 1998). In the model, each item is linked to its corresponding construct, and the covariances among those constructs are freely estimated. The model fit indices are Chi-square = 5857.90 with degrees of freedom = 1611, RMSEA = 0.072, NNFI = 0.95, CFI = 0.95, Standardized RMR = 0.070. These indices indicate that the model is acceptable (Hu and Bentler, 1999). Furthermore, a construct with either loading of indicators of at least 0.5, a significant t-value ($t>2.0$), or both, is considered to be convergently valid (Chau, 1997). In our model, all factor loadings are greater than 0.50, and all t-values are greater than 2.0. In the CFA model, convergent validity can also be assessed by testing whether or not each item's coefficient is greater than twice its standard error (Anderson and Gerbing, 1998). For our model, each item's coefficient is much greater than twice its standard error. In addition, the AVE higher than 0.50 or 0.30 for each item also means a high convergent validity (Carr and Pearson, 1999; Chen and Paulraj, 2004a; Fornell and Larcker, 1981). In our study, most of the R^2 values are higher than 0.50. Therefore, convergent validity is achieved by this study.

In order to assess discriminant validity, we build a constrained CFA model for each possible pair of constructs in which the correlations among the paired constructs are fixed to 1. This model is compared with the original unconstrained model in which the correlations among constructs are freely estimated. A significant difference of the Chi-square statistics between the fixed and unconstrained models indicates high discriminant validity (Chau, 1997; Fornell and Larcker, 1981). In this study, 36 pairs of constrained and unconstrained models were compared, with 34 pairs found significantly different at the 0.001 significance level, one difference being significant at the 0.05 significant level, and only one difference being insignificant.

Table 1. EFA of RC to customer, customer integration and performance

	Factor Loadings				
	Customer Integration	Normative RC to Customer	Customer-oriented Performance	Financial Performance	Instrumental RC to Customer
CI3	**.779**	.133	-.019	.062	-.024
CI10	**.760**	.061	.115	.070	.049
CI11	**.750**	.124	.113	.060	.079
CI8	**.734**	.089	.168	.005	.145
CI9	**.709**	.167	.221	.014	.166
CI2	**.663**	.070	-.069	.094	-.131
CI1	**.653**	.049	-.011	.048	-.148
CI5	**.621**	.132	.256	.111	-.094
CI4	**.619**	.172	.322	.117	-.049
CI7	**.607**	.125	.328	.119	-.011
CI6	**.585**	.065	.261	.129	-.073
CNRC4	.149	**.846**	.136	.026	.146
CNRC5	.126	**.840**	.143	.089	.134
CNRC3	.140	**.800**	.176	.042	.106
CNRC6	.174	**.754**	.162	.023	.196
CNRC1	.124	**.699**	.256	.120	-.054
CNRC2	.134	**.694**	.155	.082	-.064
CPF4	.108	.156	**.794**	.021	.004
CPF5	.077	.141	**.786**	.057	.050
CPF6	.123	.179	**.732**	.074	-.027
CPF1	.217	.209	**.706**	.189	.005
CPF3	.278	.196	**.667**	.204	.076
CPF2	.280	.183	**.558**	.177	.039
FPF2	.076	.071	.107	**.872**	.019
FPF4	.094	.079	.113	**.862**	-.042
FPF5	.115	.068	.078	**.836**	.025
FPF3	.133	.046	.133	**.802**	-.083
FPF1	.095	.066	.119	**.797**	.050
CIRC2	.044	.171	.016	-.023	**.820**
CIRC1	-.124	-.005	-.052	-.018	**.788**
CIRC3	-.005	.129	.086	.017	**.632**
Eigenvalue	5.564	4.008	3.751	3.714	1.926
Total variance explained			61.171%		

Table 2. EFA of RC to supplier, supplier integration and performance

	Factor Loadings				
	Supplier Integration	Normative RC to Supplier	Supplier-oriented Performance	Financial Performance	Instrumental RC to Supplier
SI7	**.881**	.097	.037	.046	.002
SI8	**.866**	.126	.022	.046	.021
SI10	**.856**	.119	.050	.052	.000
SI9	**.846**	.103	.082	.048	-.007
SI12	**.817**	.087	.127	.076	.029
SI6	**.783**	.118	-.005	-.050	.005
SI5	**.779**	.128	.042	.097	-.027
SI11	**.764**	.186	.134	.054	.056
SI3	**.666**	.150	.247	.087	.027
SI13	**.663**	.138	.267	.140	.189
SI4	**.652**	.098	.195	.067	.050
SI1	**.635**	.025	.143	.077	.000
SI2	**.562**	.070	.265	.170	-.037
SNRC4	.144	**.863**	.153	.055	.107
SNRC3	.170	**.856**	.158	.010	.084
SNRC5	.145	**.851**	.167	.012	.121
SNRC2	.195	**.769**	.164	.049	.071
SNRC6	.154	**.761**	.181	.012	.185
SNRC1	.169	**.725**	.305	.089	-.026
SPF4	.070	.175	**.832**	.093	-.010
SPF5	.090	.206	**.797**	.087	.018
SPF1	.153	.187	**.777**	.137	.141
SPF6	.119	.258	**.758**	.113	.069
SPF3	.297	.168	**.737**	.077	.082
SPF2	.314	.105	**.658**	.057	.031
FPF2	.079	.032	.098	**.875**	.035
FPF4	.111	.064	.109	**.862**	.012
FPF5	.127	.043	.098	**.830**	.051
FPF3	.096	.046	.079	**.819**	-.029
FPF1	.073	-.002	.086	**.811**	.012
SIRC1	.003	.132	-.042	.042	**.841**
SIRC2	.150	.266	.050	.001	**.803**
SIRC3	-.039	.034	.186	.015	**.638**
Eigenvalue	7.942	4.390	4.104	3.694	1.914
Total variance explained			66.800%		

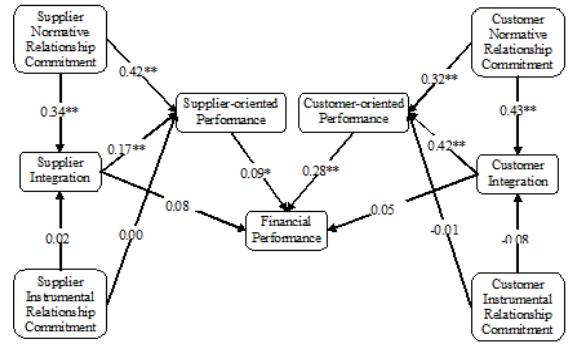
Discriminant validity can also be achieved if the squared correlation between each pair of constructs is less than AVE of any of the observed variables of these two constructs (Fornell and Larcker, 1981). In this study, the squared correlations between 36 pairs of constructs and AVE of the items for each pair of constructs are compared, with 31 pairs of constructs having a higher AVE than the responding squared correlation. Therefore, discriminant validity is achieved in this study.

Table 3. Reliability analysis

Construct	No. of questions	Cronbach's alpha
Normative RC to customer	6	0.897
Instrumental RC to customer	3	0.667
Normative RC to supplier	6	0.922
Instrumental RC to supplier	3	0.694
Customer integration	11	0.900
Supplier integration	13	0.944
Customer-oriented performance	6	0.861
Supplier-oriented performance	6	0.897
Financial performance	5	0.905

4.3. Structural equation modeling and the results of the model tests

LISREL 8.54 was used to analyze the hypothesized model. The goodness of fit indices for our model are Chi-square = 6243.73 with degrees of freedom = 1627, RMSEA = 0.074, NNFI = 0.94, CFI = 0.95, Standardized RMR = 0.13. These indices are better than the threshold values suggested by Hu and Bentler (1999). Therefore, our model can be accepted. Figure 2 shows the modified structural equation model and the standardized coefficients for the significant paths at the 0.05 and 0.01 significance levels.



**p<0.01; * p<0.05

Figure 2. Structural equation model

V. Discussion and managerial implications

5.1. How can company performance in a supply chain be improved?

Both supplier-oriented and customer-oriented performance improve manufacturers' financial performance. However, customer-oriented performance (standardized coefficient: 0.28) has a higher impact on financial performance than supplier-oriented performance (standardized coefficient: 0.09). This indicates that the manufacturers' financial performance is more positively influenced by the manufacturer's customer service performance and the related extent of customer integration. In this study, customer-oriented performance is mainly measured by delivery, flexibility, and customer service. Although delivery and flexibility have been cited as important competitive priorities in the Operations Management literature

(Aggarwal, 1997; Davis *et al.,* 2003), this study is the one of the first empirical studies to demonstrate the strong impact of supplier/customer-oriented performance in terms of delivery, flexibility, and customer service, on the manufacturers' financial performance in China. This result indicates that manufacturers in China need to place higher emphasis on flexibility, delivery, and customer service in order to achieve better financial results. Due to keen competition, cost and quality are becoming order qualifiers for many manufacturers in China. Companies need a higher flexibility in meeting the changing needs of their customers, and are able to deliver product faster and more dependable in order to win orders from their customers.

5.2. What roles does RC play in improving SCI and performance?

The result shows that manufacturers' normative RC to the supplier/customer has a significant impact on the degree to which the manufacturer is integrated with the supplier/customer. Meanwhile, the instrumental relationship does not have significant impacts on supplier/customer integration. Only normative RC is helpful in improving the extent of supplier/customer integration and supplier/customer-oriented performance. Based on this finding, manufacturers should cultivate normative RC with their supplier/customer in order to enhance the integration. With normative RC, suppliers/customers are very likely to cooperate with the manufacturer and thus be able to share information and integrate inter-organizational processes and activities with the supplier/customer in the supply chain. Due to the short term and calculative nature of instrumental RC, it does not have any significant influence in enhancing supplier/customer integration.

VI. Conclusions and limitations

This study investigates the relationships among RC, supply chain external integration, and the manufacturers' performances based on data collected from manufacturing companies in China. A holistic model was built that allowed for the simultaneous testing of these relationships by using SEM analysis. This study makes significant contribution to the SCM and relationship management literature. First, we demonstrated the importance of SCI and the role of normative RC in improving company performance. We found that instrumental RC cannot help in improving SCI and the performance of the manufacturer. Second, we found empirically that supplier/customer-oriented performance is very important in improving the financial performance of the manufacturer. Finally, the model developed and the instrument validated in this study can be used in future studies and thus foster future research in this important area. The study also provided important implications for practicing managers such as committing to the relationship and integrating with suppliers/customers in order to pursue better operational and financial performance.

Although this study makes significant contributions in both academia and practice, there are also several limitations which open up new venues for further research. For example, while RC is found to influence SCI, many other factors such as dependence, trust, and environmental uncertainty may also influence SCI and performance. Future studies should then identify more drivers for SCI and examine their impacts on SCI. Furthermore, in different industries or areas, the role of RC may be different and the relative importance of SCI and operational performance in improving financial performance may also be different. Future research can examine the impact of industry and region on the relationships between RC, SCI, and company performance. We only used the data from China to develop and test the model, employing a combination of established and new scales. Although instrumental RC had an acceptable Cronbach's alpha, it was relatively low. Future studies should further develop this construct to provide a deeper understanding of it in China. We used cross-sectional data in this study to test the RC-SCI-company performance model. Longitudinal data may provide more insights into RC, SCI, and the relationships among them. Finally, we only investigated RC, SCI, and company performance from the perspective of the manufacturers in a supply chain. It will be interesting and important to examine these issues from the perspectives of three major companies in a supply chain including suppliers, customers, and manufacturers together. Because this study only focused on RC, SCI and their impacts on company performance, the impacts of RC and SCI on supply chain performance can be investigated in future studies.

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Dr. Baofeng Huo is associate professor of operations management at the School of Management at Xi'an Jiaotong University and research fellow at Li & Fung Institute of Supply Chain Management & Logistics, The Chinese University of Hong Kong. He received his PhD in operations management from The Chinese University of Hong Kong. His research interests are logistics and supply chain management. His research has been published in the Journal of Operations Management, International Journal of Operations and Production Management, International Journal of Production Economics, and other journals, Tel. 852-3163-4493, Fax: 852-3163-4492, Email: baofenghuo@gmail.com

Dr. Xiande Zhao is professor of operations management at the Department of Decision Sciences and Managerial Economics and director of the Center for Supply Chain Management and Logistics, Li & Fung Institute of Supply Chain Management and Logistics, The Chinese University of Hong Kong. He received his PhD in business administration and MBA from the University of Utah, U.S.A. Prof. Zhao has published over fifty articles in refereed journals including the Journal of Operations Management, Journal of Consumer Research, Decision Sciences, European Journal of Operations Research, International Journal of Production Research and other journals.