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# Impact of Organizational Competence on Supply Chain Performance through Supply Chain Collaboration

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### **Abstract**

In modern business, most firms are confronted with the need to manage increasingly supply chain activities with the trading partners. Organizational competences, such as relational competence and Information Technology (IT) competence, have been recognized as critical factors to promote supply chain collaboration for obtaining supply chain competitive advantage. In this paper, we intend to extend the stream of research in Supply Chain Management (SCM) by systematically identifying the antecedents and consequences of information sharing and supply chain collaboration between supply chain partners. We empirically tested the research model using data collected from senior managers of 122 manufacturing firms in South Korea. This study found that relational competence and IT competence in supply chain were positively related to information sharing and supply chain collaboration, and information sharing was not directly related to supply chain performance, but indirectly related to supply chain performance through supply chain collaboration. Results suggest that supply chain collaboration has a greater effect on supply chain performance than information sharing.

**Keywords:** Information Sharing, IT Competence, Relational Competence, Supply Chain Collaboration, Supply Chain Management, Supply Chain Performance

# 1. Introduction

Supply Chain Management (SCM) is an important concept to effectively help a focal firm to manage its partners so that they can handle tightly coupling process between supply chain partners. Information sharing and collaboration in supply chain are critical success factors for inter-organization operating in contemporary business environments<sup>18</sup>. Inter-organizational information integration and collaboration refers to the extent to which firms electronically link and deploy Information Technology (IT) for information sharing across supply chain partner firms<sup>15,23</sup>. Information sharing and collaboration are closely related to the success of collaborative advantages and firm performance<sup>9,24</sup>. Information sharing refers to

the extent to which critical and proprietary information communicates to one's supply chain partner<sup>10,14</sup>. Supply chain collaboration will be beneficial to the parties only when all members in supply chain cooperate<sup>16</sup>. Supply chain collaboration and integration sometimes have been used interchangeably since both refer to tightly coupling process between supply chain partners<sup>23</sup>.

Since an individual firm alone is not able to satisfy diverse customer needs, firms move towards closer and more integrated supply chain<sup>24</sup>. Firms such as IBM, Dell, HP, Procter and Gamble, Toyota have forged long-term, collaborative relationships with their suppliers to reduce transaction costs and achieve a stronger competitive position<sup>3,25</sup>. In this regard, a few of studies have shown that developing idiosyncratic processes with supply chain

partners provide collaborative advantage and firm performance<sup>13,16</sup>. Many researchers have emphasized the importance of information sharing and Supply Chain Collaboration in SCM. Specially, supply chain collaboration can help firms share risks10, access complementary resources18, reduce transaction costs and enhance productivity, and enhance profit performance and competitive advantage over time<sup>11</sup>.

However, few studies have investigated the effect of organizational competence on supply chain performance through information sharing and supply chain collaboration. To guide collaborative undertakings, few researchers have suggested the importance of organizational competences in supporting information sharing and thereby facilitating collaboration in the supply chain<sup>4,19</sup>. SCM research has focused on three categories: antecedents, activities, and consequences9,11. Antecedents of organizational competences, such as relational competence and IT competence, are the factors that enhance the implementation of SCM activities like information sharing and supply chain collaboration. The magnitude of the effect of these antecedents on SCM activities was not assessed.

Based on the Resource-Based View (RBV) and the Relational View (RV), we suggest a theoretical framework to explain how some dimensions of organizational competence facilitate supply chain capabilities and supply chain performance. The purpose of this study is to examine how relational competence and IT competence can influence supply chain performance through information sharing and supply chain collaboration for obtaining competitive advantage. Given the theoretical foundations of RBV and RV in the supply chain, we thus define comprehensively relational competence and IT competence, as the antecedents of information sharing and collaboration in supply chain. And supply chain performance was defined as the consequence of information sharing and collaboration in supply chain, in terms of a focal firm's performance in managing supply chain. This study contributes to enhance the knowledge on supply chain collaboration by providing theoretical insights and empirical findings.

# 2. Literatures Review and **Hypothesis Generating**

### 2.1 Resource-based View in SCM

The extent of permeation of SCM philosophy within the firm and among supply chain partners is essential to enhance the firm's collaborative advantage and overall supply chain performance. The increasing importance of supply chain managements has led to the development of a wide range of theories to explain the formation of supply chain collaborations. The literature on supply chain collaboration represents multiple perspectives. In a prior study, examines supply chain collaboration from four perspectives: transaction cost economics<sup>22</sup>, resource based view1, relational view14, and extended resource based view8.

The two theories that provide the theoretical foundations for this research are the resource based view and the relational view. The key concept of RBV is to retain management resources for business as portfolios of resources and capabilities<sup>21</sup>. Within the supply chain management literature, RBV is a noticeable theory that has been widely used to examine performance implications in supply chain collaboration. The relational view complements the RBV by arguing that critical resources may span firm boundaries. According to the collaborative paradigm, Chen and Paulraj<sup>5</sup> suggest that supply chain is composed of a sequence or network of inter-dependent relationships fostered through strategic alliances and collaboration. Supply chain collaborative advantage and performance is based on the relational view, which elaborates on the mechanisms of joint value creation<sup>3</sup>.

Well-defined supply chain is founded on the essence of collaborative behaviors such as information sharing and supply chain collaboration. Collaborative behaviors provide a mutual decision-making process to establish toward achieving common goals across trading partners. Collaborative behaviors allow participants to jointly gain a clear understanding of future demand, develop a realistic plan to satisfy the demand, and coordinate related activities in a systematic manner to finish the task<sup>2</sup>. From the theoretical foundations of RBV and RV in SCM literature, we adopt relational competence and IT competence as two antecedents of information sharing and supply chain collaboration for achieving common goal between trading partners. We also define comprehensively supply chain performance as the consequence of information sharing and supply chain collaboration. Based on the above discussion, Figure 1 provides a research model in this study.

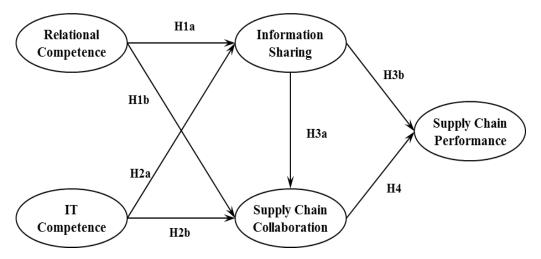


Figure 1. Research model.

# 2.2 Relational Competence and SCM **Activities**

Relational competence influences the pattern of SCM activities and can improve the performance of a supply chain<sup>14</sup>. Such a strategic intent drives trading partners to acquire, access, or develop additional resources through cooperation and communication between supply chain partners. According to Wu et al.24, relational competencies (trust, commitment, reciprocity, power) in the supply chain can facilitate information sharing and collaboration between their partners. With such an orientation, supply chain partners are able to focus on joint decision and exchange and increase investment in relational competencies14.

In addition, firms may form strategic partnerships to access or acquire unique and valuable resources that they lack, or leverage social resources such as reputation, status, and legitimacy<sup>6</sup>. Motives of the relational competence in the supply chain emphasize on the establishments of cooperation and collaboration among supply chain partners, that is, partners collaborate to purse common goals and shared value. Relational competence may promote information sharing and supply chain collaboration to build stronger relational bonds. Thus, we hypothesize the relationship between relational competence and SCM activities such as information sharing and supply chain collaboration.

Hypothesis 1a. Relational competence is positively related to information sharing in supply chain.

Hypothesis 1b. Relational competence is positively related to supply chain collaboration.

# 2.3 IT Competence and SCM Activities

Information technology has become an essential element in contemporary supply chain management, transforming the way to exchange related activities 15,18,20-21. IT characteristics, as one of critical organizational resources, can not only enhance internal enterprise integration, but also can be expanded to external enterprise integration. Paulraj et al.14 suggested that sustainability of advantage is possible when IT resources facilitate collaborative communication, leading to the development of complementary capabilities. IT competence refers to the extent to which a firm is knowledgeable and useful to utilize IT for doing business, with the implementation of IT infrastructure such as hardware, software, database, and network.

Firms with higher level of IT application have competitive position to manage the invisible asset that span market demand and create market opportunity. IT competency may aid in the development process of organizational consensus, and it also enables organizational members to be more active in information management process<sup>20,21</sup>. Sanders and Premus18 found that advancements in IT capabilities have significantly improved the extent of internal and external collaboration. Thus, we hypothesize the relationship between IT competence and SCM activities such as information sharing and supply chain collaboration.

Hypothesis 2a. IT competence is positively related to information sharing in supply chain.

**Hypothesis 2b.** IT competence is positively related to supply chain collaboration.

# 2.4 Information Sharing and SCM Performance

SCM concept includes the idea of collaboration between the members of their supply chain, in order to make more efficient use of limited resources and to capture the information and knowledge of supply chain partners<sup>12</sup>. Information sharing refers to the extent to which a firm shares a variety of relevant, accurate, complete, and confidential information in a timely manner, including mutual contract and goal setting between supply chain partners3. Zhou and Benton Jr.25 found the empirical results that information sharing significantly influences supply chain practice, and that supply chain dynamism has more influence on information sharing than supply chain practice. Cao and Zhang<sup>3</sup> define supply chain collaboration as "a partnership process where two or more autonomous firms work closely to plan and execute supply chain operations towards common goals and mutual benefits". Effective information sharing between supply chain partners may enhance most supply chain collaboration.

Lee et al.<sup>9</sup> explains that operational and strategic information sharing is defined as the extent to which supply chain partners intend to share operational and strategic information, respectively. Wu et al.<sup>24</sup> argued that information sharing is one of the critical determinants of collaborative culture to effectively facilitate allied decision making among organizations. Effective information sharing among partners can be an important driver of collaborative effort and improve supply chain performance<sup>9,24</sup>. Integrating effectively supply chain collaboration with information sharing becomes critical for improving supply chain performance. Thus, we hypothesize the relationship between information sharing, supply chain collaboration, and supply chain performance.

**Hypothesis 3a.** Information sharing in supply chain is positively related to supply chain collaboration.

**Hypothesis 3b.** Information sharing in supply chain is positively related to supply chain performance.

# 2.5 Supply Chain Collaboration and SCM Performance

SSupply chain collaboration between supply chain partners are considered to be an effective strategy for improving its collaborative advantage and supply chain performance. Collaboration encourages all players of supply chain to engage in planning, forecasting, replen-

ishment, information sharing, resource sharing, and incentive sharing<sup>17</sup>. Supply chain collaboration in this study refers to the extent which participants try to standardize the process and to interchange the electronic document between trading partners.

The necessary condition for supply chain collaboration is that the supply chain partners are able to expand the total gain due to synergy<sup>3</sup>. Supply chain collaboration promotes a firm's ability to capitalize quickly on market opportunities. Supply chain collaboration can effectively improve finance-based performance for participants such as cost revenue, and non-finance-based performance such as customer service and commercializing to market<sup>9,13,24</sup>. Thus, we hypothesize the relationship between supply chain collaboration and supply chain performance.

**Hypothesis 4.** Supply chain collaboration is positively related to supply chain performance.

# 3. Research Methodology

#### 3.1 Data Collection

Since the unit of analysis in this study was at the organizational level, data for this study were collected from a survey, which was conducted for manufacturing companies enrolled in specific supply chain industry in South Korea. SBC (Small and Medium Business Corporation), as a government agency in South Korea, supports and facilitates the cooperation and collaboration between SMEs. With the help of SBC, 600 vendors for the survey firms were selected from the list of firms participating in specific SCM systems in South Korea. The sample firms include a wide variety of manufacturing industries.

The sample respondents were expected to have knowledge or experience in supply chain management of specific industry. The target respondents were supervisor, manager or director in the manufacturing firms across the South Korea. We had tested two-round pilot studies to verify the questionnaire items with the help of academic researchers and industry executives. The survey questions consisted of five-point Likert scale with end points of "strongly disagree" and "strongly agree". A total of 600 firms were mailed. Of 131 replied questionnaires, 122 were usable with approximately 22 percent of the response rate. Table 1 indicates that sample size of 122 organizations was used for analysis. Characteristics of the respondents appear in Table 1.

Table 1. Demographics

Characteristics		Frequency	Percentage	
	Electrical/Electronics	48	39.3	
	Mechanics/Metal/Assembly	32	26.2	
Industry	Fiber/ Fabric/Chemicals	11	9.1	
	Other manufacturing	31	25.4	
	Less than 50	14	14.0	
Company employee	50-100	21	20.0	
Company employee	100-300	25	24.0	
	More than 300	43	42.0	
	Less than 10 million	26	21.3	
Annual Sales	10-50	37	30.3	
Annual Sales	50-200	22	18.1	
	More than 200	37	30.3	
	Supervisor	33	27.0	
Dagnan danta	Assistant Manager/Manager	61	50.0	
Respondents	General Manager	23	18.0	
	Director/ Managing Director	5	5.0	
Duration with SCM	Less than 6 months	23	18.9	
	06-12 months	20	16.3	
	12-24 months	28	23.0	
	More than 24 months	51	41.8	

#### 3.2 Validation of Constructs

The constructs and measurement items used in this research were adopted from previously validated measures, or developed on the basis of literature review. Table 2 presents a detailed description of the constructs in this study. We have employed PLS (Partial Least Squares) for our data analysis. PLS is a structural equation modeling technique to employ a component-based approach. The first step assesses reliability and convergent validity, and the second step is to identify discriminant validity. First, reliability was assessed by the criterion, Cronbach's a larger than 0.7. Convergent validity was assessed by three criteria: 1. Items cross loadings larger than 0.70 and statistical significance, 2. Composite construct reliability larger than 0.80 and 3. Average Variance Extracted (AVE) larger than 0.50. Next, discriminant validity was assessed by the criterion, the square root of AVE for each construct larger than its correlations with all other constructs7. As indicated in Table 3, standardized item loadings range from 0.724 to 0.925, composite construct reliabilities range from 0.870 to 0.933, and Average Variances Extracted (AVE) range from 0.646 to 0.808. In Table 4, the square root of AVE for each construct is larger than its correlations with all other constructs. Thus, these results show a highly acceptable level of reliability, convergent and discriminant validity.

Table 2. Validity Test

Constructs / Items	Cross Loadings	Cronbach's alpha	Composite Reliability	AVE
Relational Competence (RC): <sup>3</sup> We have jointly search and acquire new and relevant knowledge We have frequent face-to-face planning/communication We have frequent contacts on a regular basis	0.859 0.833 0.801	0.777	0.870	0.691
IT Competence (ITC):  14-15 The extent of user's ability to use IS  The extent of interests and participation on information-oriented organization The extent of adopting cognitive faculty for new Information system The extent of communication of related task	0.724 0.776 0.860 0.848	0.818	0.879	0.646
Information Sharing (IS):  10,24 The extent of supply chain partners exchange relevant information The extent of supply chain partners exchange confidential information	0.888 0.909	0.762	0.894	0.808
SC Collaboration (SCC):  9,24 The extent of implementing in inter-organization business process The extent of collaborate in supply chain activities The extent of standardization in inter-organization data, documentation The extent of frequently interaction of supply chain partners	0.836 0.925 0.897 0.869	0.904	0.933	0.778
SC Performance (SCP):  3,14Reduced lead time from business process transaction Reduced the cost Improved planning accuracy and analysis capability Improved planning and integrated business process Improved product quality and increased customer service		0.883	0.914	0.680

Table 3. Descriptive statistics and discriminant validity

	Mean	S.D.	RC	ITC	IS	SCC	SCP
Relational competence (RC)	3.353	0.771	0.831				
IT competence (ITC)	3.477	0.658	0.384	0.804			
Information sharing (IS)	3.360	0.731	0.502	0.345	0.899		
SC collaboration (SCC)	3.167	0.844	0.498	0.451	0.499	0.882	
SC performance (SCP)	3.522	0.736	0.134	0.561	0.317	0.432	0.825

Notes: Square root of AVE is shown on the major diagonal (bold)

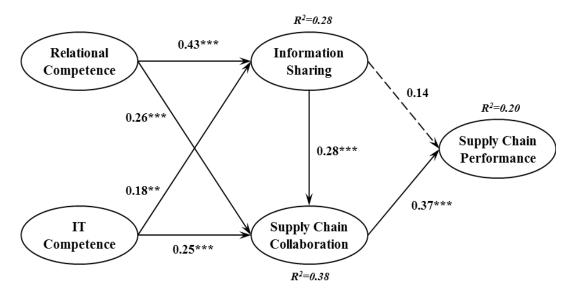
# 3.3 Hypothesis Testing

Results of the analysis for the structural model are presented in Figure 2. According to the results, relational competence has a positive effect on the information sharing (b=0.43, t=5.89, p<0.01), as stated in Hypothesis 1a. Hypothesis 1b postulates that relational competence has a positive effect on supply chain collaboration, and it is also supported (b=0.26, t=2.51, p<0.01). IT competence has a positive effect on the information sharing (b=0.18, t=2.08, p<0.05), as stated in Hypothesis 2a. Hypothesis 2b postulates that IT competence has a positive effect on supply chain collaboration, and it is also supported (b=0.25, t=3.14, p<0.01). Also, there is a positive effect of information sharing on supply chain collaboration

Table 4. Latent variable correlations and discriminant validity

Hypothesis	Path	Standard Path coefficient	t-value	Test result
Hla	Relational competence → Information sharing	0.43	5.89	Accept
H1b	Relational competence → Supply chain collaboration	0.26	2.51	Accept
H2a	IT competence → Information sharing	0.18	2.07	Accept
H2b	IT competence → Supply chain collaboration	0.25	3.14	Accept
НЗа	Information sharing → Supply chain collaboration	0.28	2.94	Accept
H3b	Information sharing → Supply chain performance	0.14	1.21	Reject
H4	Supply chain collaboration→ Supply chain performance	0.37	4.37	Accept

Notes: significance levels \*\*p<0.05, \*\*\*p<0.01



**Figure 2.** Results of the path analysis.

(b=0.28, t=2.94, p<0.01), as stated in Hypothesis 3a. They jointly explain 28% of the variance in information sharing (R2=0.28), and jointly explain 38 percent of the variance in supply chain collaboration (R2=0.38). Hypotheses 3a are related to the relationship between information sharing and supply chain collaboration. Also, the positive effect of information sharing on supply chain performance as proposed in Hypothesis 3b is not empirically supported (b=0.14, t=1.21) . We found the results that reveal the positive effect of supply chain collaboration on supply chain performance (b=0.37, t=4.37, p<0.01) as posited in Hypothesis 4. They jointly explain 20% of the variance in supply chain performance (R2=0.20). From the data analyses, other hypotheses except hypothesis 3a were accepted.

# 4. Discussion and Conclusion

# 4.1 Finding and Discussion

This study tried to suggest a theoretical framework to explain how relational competence and IT competence, as major dimensions of organizational competence, facilitate supply chain capabilities and supply chain performance. From many literatures, we could get some evidences that organizational competence can influence supply chain performance through information sharing and supply chain collaboration for obtaining competitive advantage. Given the theoretical foundations of resource-based view and relational view, we thus define comprehensively relational competence and IT competence, as the antecedents of information sharing and collaboration in supply chain. And supply chain performance was defined as the consequence of information sharing and collaboration in supply chain.

The results of this study have highlighted the critical role of organizational competence and supply chain activities in achieving supply chain performance. First, relational competence and IT competence, as a theoretical underpinning of RBV and RV, influence the pattern of SCM activities and can improve the performance of a supply chain through cooperation and communication between supply chain partners. Second, information sharing and supply chain collaboration, as major SCM activities, can influence supply chain performance for obtaining competitive advantage. This result provides an amplifying role of supply chain collaboration in achieving supply chain performance, rather than the role of

information sharing. Third, this study proved that the relational view complements the RBV by providing that critical relational competences span firm boundaries with supply chain collaborative advantage on the mechanisms of joint value creation.

The purpose of this study is to identify the relationship between organizational competence and supply chain performance through information sharing and supply chain collaboration as major SCM activities. Well-defined supply chain is founded on the essence of collaborative behaviors such as information sharing and supply chain collaboration. Especially, we proved that collaborative behavior is higher influence on SCM performance than information sharing. This provides a mutual decisionmaking process to establish toward achieving common goals across trading partners. This study contributes to suggest the empirical evidence that relational competence in SCM provides positive influence on supply chain collaboration through information sharing to gain sustainable competitive advantage, and that information sharing influences positively on supply chain performance through supply chain collaboration.

### 4.2 Conclusion and Limitations

We empirically tested the research model using data collected from senior managers of 122 manufacturing firms in South Korea. This study found that relational competence and IT competence were positively related to information sharing and supply chain collaboration. This study also found that information sharing was not directly related to supply chain performance, but indirectly related to supply chain performance through supply chain collaboration.

This study provides theoretical implications for understanding the relationship of organizational competence, and SCM activities on supply chain performance. Although previous studies have identified the importance of organizational competence and information sharing with explanation of empirical evidence, it is not easy for management to conduct appropriate programs based on the results. This study also provides theoretical insights of causal relationship by researches of resource-based view and relational view on organizational competence and supply chain collaboration. This empirical evidence shows that supply chain collaboration, as one of major SCM activities, is very important factor for the organization to initiate and sustain decision making for enhancement of supply chain performance.

This study has some limitations to generalize the results. First, we need additional studies to explain the relationship between antecedents, SCM activities, and consequences. This study has a limitation to define antecedents and consequence of information sharing and supply chain collaboration from a relational view. Especially, we focused on organizational competence such as relational competence and IT competence. We need to study more explanation factors, such as other organizational competence factors, which can influence SCM activities and SCM performance for the further research. Second, this study has another limitation in generalization of the results, because of data collection and sampling. For further research to understand real phenomenon in SCM implementation, we need to try another studies to explain the difference between trading partners in collaborative advantage or supply chain performance for more generalized studies.

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