

COMPETING THROUGH SUPPLY CHAIN PROCESS INTEGRATION CAPABILITIES: AN EXTENSION OF THE RESOURCE-BASED VIEW

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Abstract

As introduced in the 1980s, the concept of supply chain management (SCM) continues to become increasingly market-oriented, shifting the primary driver of the value chain from supply to demand. As such, recent recommendations encourage researchers to focus investigations on the supply chain process integration (SCPI) capabilities that integrate a focal firm with its network of suppliers and business customers to create value for it. However, theoretical and empirical researches pertaining to the antecedents and consequences of a focal firm's SCPI capabilities have been limited and piecemeal. The purpose of this study is to investigate the antecedents and consequences of a focal firm's SCPI capabilities. Based on a sample of 139 sales managers of manufacturing industries in Taiwan, our research findings show that (1) business process specific investment positively influences a focal firm's SCPI capabilities but domain knowledge specific investment has no significant influence on a focal firm's SCPI capabilities; (2) SCPI capabilities positively influence a focal firm's SCM performance, both operational and strategic benefits. Implications for practitioners and researchers and suggestions for future research are also addressed in this study.

Keywords: Supply Chain Process Integration Capabilities, Intangible Business Specific Investments, Resource-Based View, Supply Chain Management Performance.

1 INTRODUCTION

As competition in the 1990s intensified and markets became global, so did the challenges associated with getting a product and service to the right place at the right time at the lowest cost. In order to decrease costs and lead time as well as to increase quality and flexibility in the supply network, it is an imperative to improve coordination of the flow of goods and information across intra- and interorganizational boundaries. Organizations began to realize that it is not enough to improve efficiencies within an organization, but their whole supply chain has to be made competitive. As such, supply chain configuration is increasingly disintermediated, adopting partial or quasi-integration rather than pursuing more traditional, full vertical integration (Mason et al., 2006). Quasi-integration allows a firm to substitute ownership to partnership by integrating a set of suppliers through information technology (IT) for tighter collaborative operation execution, process planning, and control (Venkatraman and Zaheer, 1990). Consequently, the management of external suppliers and customers becomes an important source of firm competitiveness, and IT-enabled integration probably is the most effective and efficient mechanism (Shin et al., 2000).

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Supply chain process integration (SCPI) capabilities is defined as the degree to which a focal firm has integrated the flow of information, materials, and finances with its supply chain partners, especially, with its important business customers (Rai et al., 2006). Superior SCPI capabilities, both with focal firms and customers, are believed to lead to significant overall performance improvements, thereby making a company world class (Rai et al., 2006; Vereecke and Muylle, 2006). Focal firms of a value chain are at the forefront of the changes by virtue of being in the middle and operating on thin margins. They are squeezed from both business customers and suppliers to add more value in the value chain (El Sawy et al., 1999). Moreover, the benefits through IT-enabled integration have been typically examined from the viewpoint of business customers or network leaders, with small amounts of attention given to the benefits accrued to focal firms (e.g., Subramani, 2004; Wang et al., 2006).

Despite the critical role in SCM, theoretical and empirical research pertaining to the digitally enabled supply chain integration phenomenon and the antecedents and consequences of a focal firm's SCPI capabilities has been limited and piecemeal (Sahin and Powell, 2002; Rai et al., 2006). As Gulati (1999) stated, social factors resulting from the embeddedness of firms in a rich social context can be influential in altering the opportunity set perceived by firms. Moreover, productivity gains in the value chain are possible when trading partners are willing to make relation-specific investments and combine resources in unique ways (Dyer and Singh, 1998). Therefore, drawing on concepts from the interrelated literature streams, the objective of this study is to investigate the antecedents and consequences of a focal firm's SCPI capabilities. Following the arguments stated by Subramani (2004), we concentrate the discussion on relation-specific intangible investments by focal firms since Bakos and Brynjolfsson (1993) highlight intangible investments as being non-contractible and thus contributing to contact incompleteness in IT-mediated supply relationships. In this study, an extension of the resource-based view (RBV) (Lavie, 2006) is employed to provide insightful implications for understanding the dynamics and importance of a focal firm's SCPI capabilities and how it impacts a focal firm's SCM performance.

2 THEORETICAL FRAMEWORK AND HYPOTHESES

2.1 Resource-Based View

Figure 1 identifies the key constructs and main relationships examined in the study. As shown, business process specific investment and domain-knowledge specific investment are hypothesized to affect SCPI capabilities. In additions, SCPI capabilities are hypothesized to affect a focal firm's SCM performance, both operational and strategic benefits. The following section elaborates on these relationships and explains the theoretical underpinning of these hypotheses.

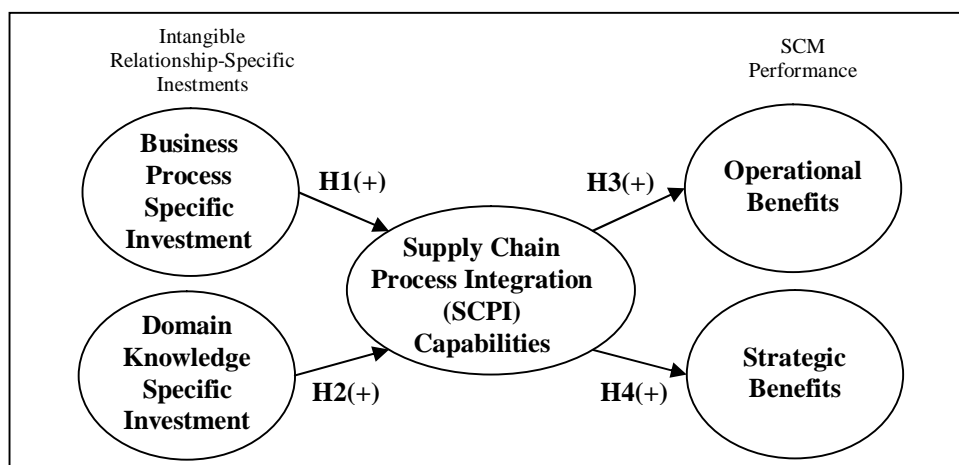


Figure 1. The Proposed Conceptual Model and Research Hypotheses

The resource-based view (RBV) emphasizes heterogeneous firm resource endowments as a basis for competitive advantage (Peteraf, 1993; Barney, 1991). It adopted an inward-looking view, depicting companies as a collection of resources and capabilities required for product or market competition (Lavie, 2006). Because resources which are needed, chosen and implemented by companies are heterogeneously distributed across firms (Barney, 1991), they tend to survive competitive imitation when protected by isolating mechanisms such as time-compression diseconomies, path dependence, embeddedness and causal ambiguity (Peteraf, 1993). According to the RBV, firms can develop isolating mechanisms or resource-position barriers that secure their economic rents. Therefore, conventional RBV studies have assumed that value-creating resources are owned and controlled by the focal firm (Amit and Schoemaker, 1993; Barney, 1991).

As Lavie (2006) argues, the proprietary assumption of the traditional RBV does not pose a limitation to the extent that the competitive environment is populated by independent firms. In recent years, accumulated evidences suggest that resources of alliance partners transferred via direct interfirm interactions have a considerable impact on firm performance. These resources can be referred to as network resources that extend the opportunity set of the firm (Gulati, 1999). Lavie (2006) proposes an extension of the RBV and argues that the resource-based competitive advantage of a focal firm participating in an alliance can be partitioned into four elements corresponding to four different types of rents: (1) internal rent, (2) appropriated relational rent, (3) inbound spillover rent, and (4) outbound spillover rent.

Internal rent, the focus of traditional RBV, refers to the combination of Ricardian rents and quasi-rents derived from the internal resources of the focal firm. Ricardian rents result from scarcity of resources, whereas quasi-rents encompass the added value that a firm can extract from its specialized resources relative to the value that other firms can extract from similar resources (Peteraf, 1993). *Appropriated relational rent* refers to a common benefit that accrues to alliance partners through combination, exchange, and codevelopment of idiosyncratic resources (Dyer and Singh, 1998). Relational rents are extracted from relation-specific assets, knowledge-sharing routines, complementary resources, and effective governance mechanisms. They can be extracted only from resources that are intentionally committed and jointly possessed by the alliance partners. (Lavie, 2006). *Inbound spillover rent* pertains to the unintended gains owing to both shared and nonshared resources of the alliance partners. Such rent is usually associated with horizontal alliances among competitors that collaborate strategically (Lavie, 2006). In such collaborations, firms seek to internalize the resources of their alliance partners and thus improve their competitive position vis-à-vis these partners (Hamel, 1991). Contrary to the inbound spillover rent, *Outbound spillover rent* refers to the unintended leakage that benefits the alliance partners. The more salient the opportunistic behavior of the focal firm's alliance partners and the stronger their bargaining power and absorptive capacity are, the greater the firm's loss of outbound spillover rent derived from both its shared and nonshared resources will be.

To conclude, the extension of the RBV proposed by Lavie (2006) suggests that the competitive advantage of an interconnected firm, based on the combination of internal resources and network resources, is either greater or smaller than the competitive advantage of the same firm if evaluated only on the basis of its internal resources. Moreover, firm-specific, partner-specific, and relation-specific factors play significant roles in determining the type and magnitude of rents extracted from both the internal and external resources of alliance partners.

2.2 Supply Chain Process Integration Capabilities

SCPI capabilities are conceptualized as a formative construct with three sub-constructs: information flow integration, physical flow integration, and financial flow integration (Rai et al., 2006). *Information flow integration* is defined as the extent to which operational, tactical, and strategic information are shared between a focal firm and its supply chain partners. The sharing of demand-related information, inventory and sales positions, production and delivery schedules, and performance metrics are relevant indicators of information flow integration. Information sharing

allows retailers, manufacturers, and suppliers to improve forecasts, synchronize production and delivery, coordinate inventory-related decisions, and develop a shared understanding of performance bottlenecks (Simchi-Levi et al., 2000). *Physical flow integration* is defined as the degree to which a focal firm uses global optimization with its supply chain partners to manage the stocking and the flow of materials and finished goods. By increasing responsiveness to customer demand through strategies such as postponement of differentiation (Feitzinger and Lee, 1997), physical flow integration can improve customer relationships and customer service (Ellinger et al., 1999). Such integration is expected to improve long-term competitiveness and growth (Goldhar and Lei, 1991). *Financial flow integration* is defined as the extent to which the exchange of financial resources between a focal firm and its supply chain partners are driven by workflow events. Important downstream flows to be managed include prices, invoices, and credit terms, while essential upstream flows to be coordinated include payments and account payables (Rai et al., 2006). Financial flow integration can enable better working capital and cash flow management through event-based triggering of payables and receivables.

2.3 Intangible relationship-Specific Investments

Dyer and Singh (1998) argue that alliances generate competitive advantages and relational rents only when they move the relationship away from the attributes of arm's-length market relationships into partnerships. Rents result from the efficient and effective development, deployment, allocation, exchange, and utilization of resources (Lado et al., 1997). Partnerships are especially valuable when they provide firms with an avenue for the sustained earnings of rents in situations where competitive advantage requires the synergistic combination of resources which a firm is unable to purchase through a market transaction or to develop internally in a timely and cost-effective manner (Madhok and Tallman, 1998).

The relation-specific investment is a necessary condition for rents (Amit and Schoemaker, 1993). Productivity gains in the value chain are possible when firms are willing to make relation/transaction-specific investments (Williamson, 1985). Relation-specific investments can be divided into two broad categories: tangible specific assets and intangible specific assets (Subramani and Venkatraman, 2003). Three types of tangible asset specificity are (1) site specificity, (2) physical asset specificity, and (3) human asset specificity (Williamson, 1985). Meanwhile, Kogut and Zander (1992) view relationship-specific intangible investments in organizations as comprising two components: "know-how" and "know-what". "Know-how" refers to the firm-level understanding of task execution; it links to the associated intangible investments that are made to conceive tasks and create standard operating procedures for efficient task execution. "Know-what" refers to context-sensitive, tacit understanding of subtleties that allows effective action and the resolving of ambiguities in task planning and execution. As such, Subramani and Venkatraman (2003) term the intangible relationship specificity of these two components "business process specific investment" and "domain knowledge specific investment," respectively.

Business process specific investment refers to the degree to which critical business processes of a focal firm are specific to the requirements of the customer in an interorganizational relationship. Specialized business processes include context-specific processes for new product introduction, customer service, inventory management, and quality control. Specialized routines or standard operating procedures evolve over time in organizations through the codification and institutionalization of successful partners derived from repeated execution of activities (Nelson and Winter, 1982). *Domain knowledge specific investment* refers to the degree to which critical assets of knowledge of a focal firm are specific to the requirements of a customer. It refers to an organization's ability to access and deploy a specific body of prior knowledge (Teece, 1998) in an interfirm relationship.

We argue that by engaging in the quasi-integration partnership with its business customers through relation-specific intangible investments, including business processes and domain knowledge, a focal firm might tacitly develop a set of routines and an integration capabilities with its information,

physical, and financial flows which underpinning the way it interact with its business customers and suppliers. That is, by “cementing relationships” with customers through relation-specific intangible investments, including business processes and domain knowledge, a focal firm does not only gain the expected network resources and relational rents, but also form the integration of the information, physical, and financial flows forwards or backwards in the industry value chain or in establishing a technical lead. Therefore, we propose the following:

H1: *The business process specific investment for its business customers positively influences a focal firm’s SCPI capabilities.*

H2: *The domain knowledge specific investment for its business customers positively influences a focal firm’s SCPI capabilities.*

2.4 Supply Chain Management Performance

A firm’s aggregation performance is relative to its competition. In this study, we adopt operational benefits and strategic benefits for measuring a focal firm’s SCM performance (Mukhopadhyay and Kekre, 2002). *Operational benefits* arise from lowered transaction and production costs through a focal firm’s SCM system use. Examples include the faster invoicing and payment settlement, the more-efficient inventory management, and the automated and rationalized business processes. In contrast, *strategic benefits* arise from the positioning of firms themselves to take advantage of opportunities in the relationship. These include the development of new products and services, a richer understanding of the partner, the nuances of the exchange, and the ability to recognize and respond to changes in the relationship. This parallels the distinction between outcomes linked to cost reduction and those linked to end-product enhancement in interfirm relationships (Mukhopadhyay and Kekre, 2002).

We argue that SCPI capabilities do not only generate a focal firm’s internal rents but also the relational rents because each of the three dimensions of SCPI capabilities reflects its ability to perform cross-functional and interorganizational activities in supply chain management. SCPI capabilities impact a focal firm’s SCM performance not only on the aspect of operational benefits such as eliminating order-entry errors, reducing inventory costs, submitting invoices electronically that could enable timely payments by customers, but also on the aspect of its strategic benefits such as learning about business customers’ markets and their preferences, and developing new business opportunities with business customers in the future. Based on these arguments, the following is consequently hypothesized:

H3: *A focal firm’s SCPI capabilities positively influence its operational benefits of supply chain management performance.*

H4: *A focal firm’s SCPI capabilities positively influence its strategic benefits of supply chain management performance.*

3 METHODOLOGY AND RESEARCH DESIGN

3.1 Sample and Data Collection

A cross-sectional mail survey was administrated for collecting data from large and medium-sized manufacturing firms in Taiwan which are randomly selected. The sample firms for this study were drawn from “2006 Taiwan Top 1000” list issued by the Common Wealth Magazine, a leading business magazine in Taiwan. Ideally, informants need to have some knowledge of the degree of system and activity integration with their companies’ business customers, any enhancement of channel capabilities the firm has experienced, and the firm’s SCM performance. As such, target informants for the survey are selected as the sales manager of these firms since we believe that they should be the most

knowledgeable and reliable informants within a company to answer our survey. In addition, informants are asked to select the company's most important customer while responding to the questions on our research constructs.

A total of 1,000 questionnaires were sent out and 143 returned. Four questionnaires were found to be invalid. A total of 139 valid responses (13.90% response rate) were collected and analyzed. Samples of this study consist of manufacturers in a variety of areas. The majority of the respondents are from Electronics (27.22%), Semiconductor / Optoelectronics (15.65%), Metal (12.52%), Electromechanical (6.00%), and so on. Respondents that represented less than 4% of the sample come from the Plastics & Rubbers products, Cars & related parts, Non-Metal minerals, Communication Networks, Pharmaceuticals & Biotechnology, Food/Drinks, and Paper industries, among others. Comparing to the "2006 Taiwan Top 1000" list, the sampling frame, we found that the distribution of our sampled firms is a good representation of the sampling frame. In addition, as indicated in Table 1, the majority of the respondents are managers (61.15%), followed by executives (20.14%) and others (18.71%). The respondents averaged 10.29 years of working experience, and the average number of years in the respondents' current position is 4.20. We believed that the respondents are sufficiently knowledgeable to answer the survey.

Demographic Variables	Frequency	Percentage
Respondent Position		
Executive	28	20.14%
Manager	85	61.15%
Others	26	18.71%
Respondent's Service Year (Mean=10.29)		
0-10	81	58.27%
10-20	37	26.62%
20-30	19	13.67%
30-40	2	1.44%
Years in Current Position (Mean = 4.20)		
0-5	89	64.03%
5-10	38	27.34%
10-15	10	7.19%
15-20	2	1.44%

Table 1. Demographic Profile of the Respondents (N=139)

3.2 Instrument Development

All constructs are measured by using multiple-item scales, and measurement items were adapted from the literature wherever possible, as indicated in Appendix. In addition, items associated with these constructs employ a seven-point Likert type scale where informants are asked to state their agreement with a given statement on a scale that ranged from "strongly disagree" to "strongly agree" with its midpoint anchored as "neither agree nor disagree."

For measuring intangible relationship specific investments, business process and domain knowledge specific investment scales are adapted from Subramani and Venkatraman (2003). SCPI capabilities are based on Rai et al. (2006). The operational benefit items are adapted from Wang et al. (2006). Finally, as for the strategic benefit scales, we adopt them from Subramani (2004).

3.3 Control Variables

To exclude the possible effects of extraneous factors, the research framework of this study incorporates two variables influencing a focal firm's SCM performance: firm size and length of association between a focal firm and its business customers. Hypotheses related to these variables

are not proposed because this study does not attempt to develop theory related to their effects. However, they are included in the research framework to assess the effects of the framework's independent variables on dependent variables, beyond those attributable to these control variables.

4 DATA ANALYSIS AND RESULTS

4.1 Scale Validation: Convergent Validity and Discriminant Validity

We conduct the data analysis in two parts - scale validation and hypothesis testing. Scale validation proceeds in two phases: convergent validity and discriminant validity analyses. Convergent validity of scale items was assessed by three criteria suggested by Fornell and Larcker (1981): (1) all item factor loading (λ) should be significant and exceed 0.5, (2) composite reliabilities (CR) for each construct should exceed 0.80, and (3) averaged variance extracted (AVE) for each construct should exceed 0.50; in other words, the square root of AVE should exceed 0.71. In addition, internal consistency reliability is generally considered a necessary but not sufficient condition for convergent validity. Hence Cronbach's alpha was also computed for each construct, and it should be larger than 0.7 (Nunnally, 1978).

As indicated in Appendix, standardized CFA loadings for all scale items in the CFA model are significant at $p < 0.001$ and exceed the minimum loading criterion of 0.50. Meanwhile, as illustrated in Table 2, we can see that AVE of each construct exceeds 0.5, and composite reliabilities and Cronbach's alpha of all factors also exceed the required minimum of 0.80 and 0.7. Hence all three conditions for convergent validity are met.

Construct	Mean	S.D.	Cronbach's Alpha	Composite Reliability	AVE	1	2	3	4	5
1. BP_SPEC	3.74	1.85	0.91	0.94	0.85	0.92				
2. DK_SPEC	4.49	1.46	0.93	0.95	0.78	0.60	0.88			
3. SCPI	4.84	1.05	0.93	0.94	0.57	0.36	0.30	0.76		
4. OP_BENEFIT	5.40	0.94	0.92	0.93	0.62	0.25	0.15	0.69	0.79	
5. STG_BENEFIT	5.29	1.11	0.89	0.93	0.81	0.17	0.19	0.62	0.70	0.90

Notes:

a. The main diagonal shows the square root of the AVE (averaged variance extracted).

b. Significant at $p < .01$ level is shown in bold.

c. BP_SPEC as for business process specific investment, DK_SPEC as for domain knowledge specific investment, SCPI as for SCPI capabilities, OP_BENEFIT as for operational benefits, STG_BENEFIT as for strategic benefits.

Table 2. Reliability, Correlation Coefficients and AVE Results

Meanwhile, discriminant validity means the degree to which measures of two constructs are empirically distinct (Bagozzi and Yi, 1991). Discriminant validity is shown when the square root of each construct's AVE is larger than its correlations with other constructs (Chin, 1998). From the data presented in Table 2, we can see that the highest correlation between any pair of constructs in the CFA model is 0.70 between operational benefit (OP_BENEFIT) and strategic benefit (STG_BENEFIT). This figure is lower than the lowest square root of AVE among all constructs. Hence, the discriminant validity criterion is also met for our data sample.

4.2 Hypothesis Testing

We examined the main effects specified in hypotheses H1 through H4 by using bootstrap analysis in PLS method (Chin, 1998). Bootstrap analysis is done with 500 subsamples and path coefficients are

reestimated using each of these samples. As Rai et al. (2006) indicated, the vector of parameter estimates is used to compute parameter means, standard errors, significance of path coefficients, indicator loadings, and indicator weights. The main effects model (Figure 2) examine the effect of business process specific investment on SCPI capabilities (H1), the effect of domain knowledge specific investment on SCPI capabilities (H2), the effect of SCPI capabilities on operational benefit (H3), and the effect of SCPI capabilities on strategic benefit (H4).

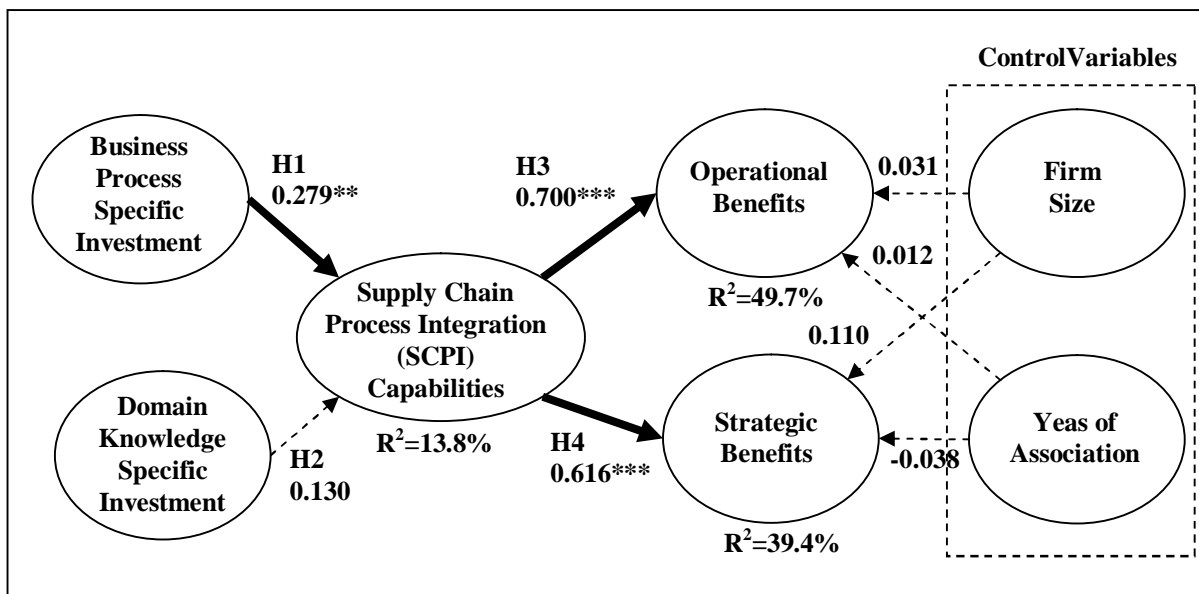


Figure 2. Data Analysis Results

First of all, the two specified control variables, firm size and years of association, are not found to be significantly associated with SCM performance, both operational benefits and strategic benefits. Second, with regard to the specific hypotheses, we found:

- I Hypothesis 1 (H1) and 2 (H2): As expected, higher level of business process specific investment have a strong and significant effect on SCPI capabilities (beta=0.279; p<0.01). However, contrary to our expectation, domain knowledge specific investment does not have significant effect on SCPI capabilities. Business process specific investment and domain knowledge specific investment jointly explain 13.8 percent of the variance in SCPI capabilities, with business process specific investment contributing a larger proportion to that explanation.
- I Hypothesis 3 (H3) and 4 (H4): As predicted, SCPI capabilities has significant and positive effect on both operational benefit (beta = 0.700; p<0.001) and strategic benefit (beta = 0.616; p<0.001). Furthermore, SCPI capabilities also explain a larger proportion of the variance in operational benefit (R² = 0.497) and strategic benefit (R² = 0.394).

We will discuss these findings in details in next section.

5 DISCUSSIONS

This study aims to shed light on the antecedents and consequences of a focal firm's SCPI capabilities. The results suggest that business process specific investment significantly yields a focal firm's SCPI capabilities, and then generates sustained gains in firm's SCM performance, particularly operational benefits and strategic benefits. These findings have significant implications for the management of intangible relation-specific investment and SCPI capabilities, as they need to be focused and leveraged to create SCM performance gains.

As expected, our empirical findings demonstrate that a focal firm's business process specific investment on its key business customer has a positive impact on its SCPI capabilities. Our result is consistent with Dyer and Singh's (1998) reasoning that relationship-specific process and knowledge stemming from frequent and intense partner interactions leads to a relational capability which can improve transactional and strategic outcomes as well as firm-level competitive advantages. Business process specific investment enables a focal firm to communicate efficiently and effectively with its key business customer, reduces communication errors, and enhances the volume of interfirm transactions and opportunities for the interfirm integration of financial, information, and physical flows, in other words, the SCPI capabilities. This role is particularly salient in the context of SCM system where both suppliers and a dominant buyer contend for the benefits created by the use of information system (Subramani, 2004).

In contrast, our result does not find a positive and significant association between domain knowledge specific investment and SCPI capabilities. A possible explanation of this finding may be as follows. Domain knowledge specificity refers to the degree to which critical assets of knowledge of a focal firm are specific to the requirements of a customer. It relates to an organization's ability to access and deploy a specific body of prior knowledge (Teece, 1998) in an interorganizational relationship. However, the insignificant effect of domain knowledge specific investment on SCPI capabilities might imply that a focal firm's effort to monitor its customers' needs and markets does not lead to the generation of a focal firm's SCPI capabilities because its business customers might not approve new strategy ideas or because of their inertia. Besides, another possibility for this insignificant relationship between domain knowledge specific investment and SCPI capabilities might be the fact that indicators of domain knowledge specific investment could not completely reflect the completed picture of it. More sophisticated measurements that capture variance in this construct across different industrial types need to be incorporated in future studies.

Meanwhile, our result confirms that a focal firm's SCPI capabilities have a substantial effect on SCM performance, both operational and strategic benefits. SCPI capabilities are deeply embedded into the structure of interfirm operational processes through intangible relation-specific investment. In addition to the requirement of significant time, such dedicated capabilities can be exploited in current interfirm operation or in the future to create value for supply chain partners (Patnayakuni et al., 2006). Besides, the strong effect of SCPI capabilities on operational benefits ($\beta=0.700$) suggests that SCPI capabilities improve the operational performance relative to competition by squeezing out production cost, inventory cost, and distribution cost, and facilitates more product innovation or improvement. Furthermore, the strong effect on strategic benefits ($\beta=0.616$) also suggests that SCPI capabilities enable market penetration and provides the agility to ensure that sales opportunities associated with the launch of new products and time to market.

6 IMPLICATIONS AND CONCLUSIONS

6.1 Limitations and Suggestions for Future Researches

We acknowledge that a number of research limitations exist in our research which should be overcome in the future. The first limitation is related to the choice of sample frame. The selection of firms in manufacturing industry for the sampling frame excludes other segments which possess equivalent supply chain collaboration relationship compared to the manufacturing industry. Thus, the study of SCPI capabilities should be extended to other industries, such as consumer goods or services, to help generalize the findings in the future study. Second, there are potential moderators which might moderate the relationship between intangible relational specific investments and SCPI capabilities. Especially, it has been argued that moderating effects can be found for technology, market turbulence and competitiveness (Kirca et al., 2005). It would be interesting to test whether or not such effects can

be found on the relationship level as well. In sum, these questions open up fertile grounds for future research opportunities.

6.2 Implications and Conclusions

This study offers several implications for theory. Viewed from the RBV perspective, this study contributes to the related literatures by providing empirical supports for the relationship between relational assets, SCPI capabilities, and SCM performance. First, this paper reinforces that relation-specific assets are the source of competitive advantage which lead to firm's relational capabilities (Dyer and Singh, 1998). In our study, business process specific investment significantly impacts a focal firm's SCPI capabilities. Furthermore, such intangible, relationship-specific investment by a focal firm can create lock-in effect, thereby generating a focal firm's valuable and imitable SCPI capabilities and the subsequent sustained competitive advantages (Subramani, 2004). Second, this paper also confirms that SCPI capabilities are critical complementary resource endowments that span firm boundaries so firms earn not only their internal rents but also relational rents, which are jointly generated with alliance partners (Lavie, 2006). Such capabilities enable focal firms to unbundle information flows from physical flows, and to share information with their supply chain partners to create information-based approaches for superior demand planning, for the staging and movement of physical products, and for streamlining voluminous and complex financial work processes (Rai et al., 2006). Consequently, these IT-enabled SCPI capabilities result in significant and sustained firm performance gains, especially in operational excellence and revenue growth.

For practitioners, an organization's ability to leverage resources and capabilities of supply chain partners has become increasingly important as business networks compete against each other. As such, today's competition is moving from "among organizations" to "between supply chains", and more and more organizations are increasingly adopting SCM practice in the hope of reducing supply chain costs and securing competitive advantage (Li et al., 2006). Despite some organizations have realized the importance of implementing SCM, they often do not know exactly what to implement because of the lack of understanding of what constitutes a comprehensive set of SCM practices. By validating a multi-dimensional and operational measurement of the construct of SCPI capabilities proposed by Rai et al. (2006) and by demonstrating its efficacy in enhancing SCM performance in operational and strategic benefits, the present study provides managers of focal firms with a useful tool for evaluating the comprehensiveness of their current SCM practices.

Given the turbulence of many industries, understanding what facilitates the efficient delivery and cooperation way of products and services to satisfy customers' needs offers scholars continuously and increasingly important challenge. This study provides empirical evidence to support conceptual and prescriptive statements in the literature regarding the impact of SCPI capabilities. These higher-order boundary-spanning capabilities require the sharing of strategic, tactical, and operational information and global optimization of physical flows across supply chains. Development of SCPI capabilities position firms to realize improvements in their SCM performance, specifically operational and strategic benefits, thereby their sustained competitive advantages. We call managers and researchers to take up the challenge.

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Appendix – Measurements

Constructs	Standardized Loadings
Business Process Specific Investment (Subramani, 2004)	
I The extent to which the software and applications used (e.g., billing, inventory management, EDI, etc.) in supplying customer A are relatively similar or are significantly different from what you use with other customers.	0.94
I The extent to which the administrative procedures used (e.g., vendor selection, cost accounting procedures, etc.) in supplying customer A are relatively similar or are significantly different from what you use with other customers.	0.97
I The extent to which the operating procedures used (e.g., manufacturing, bar-coding, packaging, shipping procedures, etc.) in supplying customer A are relatively similar or are significantly different from what you use with other customers.	0.87
Domain Knowledge Specific Investment (Subramani, 2004)	
I The extent to which the knowledge and understanding used in planning for new products programs for customer A is significantly specific to the relationship or is relatively similar to what you use with other customers.	0.89
I The extent to which the knowledge and understanding used in product conception and design for customer A is significantly specific to the relationship or is relatively similar to what you use with other customers.	0.89
I The extent to which the knowledge and understanding used in determining product pricing for customer A is significantly specific to the relationship or is relatively similar to what you use with other customers.	0.90
I The extent to which the knowledge and understanding used in competition analysis for customer A is significantly specific to the relationship or is relatively similar to what you use with other customers.	0.87

<p>l The extent to which the knowledge and understanding used in strategic planning for customer A is significantly specific to the relationship or is relatively similar to what you use with other customers.</p>	0.90
<p>SCPI Capabilities (Rai et al., 2006)</p> <p>l <i>Financial Flow Integration</i></p> <p>n Account receivables processes are automatically triggered when we ship to our customers</p> <p>n Account payable processes are automatically triggered when we ship to our suppliers</p> <p>l <i>Physical Flow Integration</i></p> <p>n Inventory holdings are minimized across the supply chain</p> <p>n Supply chain-wide inventory is jointly managed with suppliers and logistics partners</p> <p>n Suppliers and logistics partners deliver products and materials just in time</p> <p>n Distribution networks are configured to minimize total supply chain-wide inventory costs</p> <p>l <i>Information Flow Integration</i></p> <p>n Production and delivery schedules are shared across the supply chain</p> <p>n Performance metrics are shared across the supply chain</p> <p>n Supply chain members collaborate in arriving at demand forecasts</p> <p>n Our downstream partners (e.g., distributors, wholesalers, retailers) share their actual sales data with us</p> <p>n Inventory data are visible at all steps across the supply chain</p>	<p>0.57</p> <p>0.58</p> <p>0.85</p> <p>0.71</p> <p>0.65</p> <p>0.82</p> <p>0.88</p> <p>0.82</p> <p>0.85</p> <p>0.77</p> <p>0.72</p>
<p>Operational Benefits (Wang et al., 2006)</p> <p>Please indicate the extent to which you are receiving the following benefits as a result of your relationship with CUSTOMER A:</p> <p>l production cost</p> <p>l inventory cost</p> <p>l distribution cost</p> <p>l put new product designs into production quickly</p> <p>l operate efficiently at different levels of output</p> <p>l develop or modify new product designs</p> <p>l produce a wide variety of product mix simultaneously</p> <p>l respond to market demand on time</p>	<p>0.69</p> <p>0.71</p> <p>0.62</p> <p>0.82</p> <p>0.85</p> <p>0.92</p> <p>0.74</p> <p>0.90</p>
<p>Strategic Benefits (Subramani, 2004)</p> <p>Please indicate the extent to which you are receiving the following benefits as a result of your relationship with CUSTOMER A:</p> <p>l learning about customers and markets for our products</p> <p>l creation of new products, product enhancements</p> <p>l development of new business opportunities</p>	<p>0.88</p> <p>0.86</p> <p>0.96</p>