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using the SSPP paradigm

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Abstract

The purpose of this paper is to propose a framework on the relationship between *fit* among strategy, structure, and processes, and performance, which is called the SSPP paradigm, in the supply chain management (SCM) context. This paper reviewed empirical literature on the relationship between strategy, structure, and/or processes in supply chains and performance. The literature was collected from major journals in the areas of logistics, operations, and supply chain management. As a result, we found that most of the papers reviewed in this paper have focused on the relationship between supply chain processes and performance. The current research, however, has paid little attention to the impact of the linkage between supply chain processes and strategy/structure on performance. This paper is the first to incorporate typical patterns of supply chain strategies and the main dimensions of the supply chain structure, processes, and performance that have been fragmentarily discussed in prior studies into a SCM-related SSPP framework. The framework is useful to understand more various and wide-ranging phenomena in supply chains.

Keywords

Supply chain management, *Fit* among strategy, structure, and processes, Impact on performance, SSPP paradigm

1. Introduction

In the fields of strategic management and organizational design, the following proposition is well known: a *fit* among strategy, structure, and processes yields superior performance (Galbraith and Nathanson, 1978; Miles and Snow, 1978). That is, firms that have achieved proper alignment among strategy, structure, and processes are expected to perform better than competitors that lack such alignment. The proposition, which is called the “SSPP (strategy-structure-processes-performance) paradigm,” is classical, and is relevant in the research area of supply chain management (SCM) even today.

Strategy, structure, and processes are essential management elements of SCM. However, as will be shown in the literature review section, it is clear that empirical studies on the relationship among strategy, structure, and/or processes in supply chains and performance have mainly focused on the relationship between processes and performance. Conversely, the SSPP paradigm, which includes strategy and structure, has not been rigidly tested by previous empirical studies. In addition, with regard to strategy and inter-departmental structure, the observed variables have not been converged yet because there are few studies that include these constructs. Such a process-focused discussion with lack and ambiguity related to strategy and structure prevents us from comprehensively discussing the success factors of SCM. For example, if firms adopt different strategies, they would need to change processes. A process-focused study that does not consider the difference of supply chain strategies may not sufficiently understand the successful integration mechanisms of supply chain processes.

In this paper, the authors expand such a process-focused discussion into a comprehensive one that includes strategy and structure. Specifically, a framework that includes typical patterns of supply chain strategies and the main dimensions of the supply chain structure, processes, and performance is proposed on the basis of not only the results of literature review but also increasing theoretical and empirical studies on supply chain strategy (Fisher, 1997; Lee, 2002; Lo and Power, 2010; Mason-Jones et al., 2000; Narasimhan et al., 2006; Naylor et al., 1999; Payne and Peters, 2004; Qi et al., 2009; Ramdas and Spekman, 2000; Selldin and Olhager, 2007; Stavroulaki and Davis, 2010), some valuable works on organizational structure in the logistics and SCM context (Chow et al., 1995; Kim, 2007; Stank and Traichal, 1998), and recent study on organizational design (Galbraith, 2002).

This paper is organized as follows: Section 2 introduces the SSPP paradigm, proposes a research question, explains the methodology of literature review, and reports the results; Section 3 points out the problems of the previous empirical studies and

proposes a framework of the SSPP paradigm in the SCM context; and finally, Section 4 describes some implications and directions for future research.

2. Literature review

2.1 SSPP paradigm

Galbraith and Nathanson (1978) and Miles and Snow (1978) extended the SSP (strategy-structure-performance) paradigm (Chandler, 1962; Rumelt, 1974), which is the theory that a combination of strategy and structure results in improved performance, to the SSPP paradigm, which includes processes. The reason is that “other dimensions such as resources allocation processes, information systems, cross-departmental decision processes, career path and compensation systems have not received the same level of research attention that has been accorded to structure” (Galbraith and Nathanson, 1978). In this sub-section, first, we briefly look at the definition of each construct and the meaning of *fit* among the three constructs in the SSPP paradigm.

In Galbraith and Nathanson (1978), strategy is defined as “specific actions deriving from the strategy formulation process,” which is “the process of deciding the basic mission of the company, the objectives that the company seeks to achieve, and the major strategies and policies governing the use of the firm’s resources to achieve its objectives.” They mainly focus on the strategies of product and market diversification, which are corporate-level strategies. They view structure as “the segmentation of work into roles such as production, finance, marketing and so on; the recombining of roles into departments or divisions around functions, products, regions, or markets; and the distribution of power across this role structure.” For example, there are several structural types such as centralized functional organization, decentralized multi-divisional organization, and matrix organization. Similarly, they view processes as “the direction and frequency of work and information flows linking the differentiated roles within and between departments of the complex organization.” Specifically, processes include resource allocation processes, performance evaluation and reward systems, and integration mechanisms.

The concept of *fit* means an internally consistent set of practices among strategy, structure, and processes. It is not enough to match strategy and structure, and to match strategy and processes. Achieving a match of all these dimensions to one another would lead to superior performance.

2.2 Research question and methodology

The SSPP paradigm is useful not only for corporate-level management or strategic business unit-level management, which is targeted by Galbraith and Nathanson (1978) and Miles and Snow (1978), but also for functional-level management. For example, the paradigm has been used in the field of international marketing (Xu et al., 2006). Using structural equation modelling of a co-variation effect model, which views fit as a pattern of internal consistency among a set of related variables, they found that a fit among strategy, structure, and processes is positively associated with performance. Barczak (1995), likewise, adopted the paradigm in the field of new product development. She analyzed the link between new product strategy and structure, and between new product strategy and process using chi-square analysis.

In the field of logistics and SCM, a few theoretical and empirical studies have used the SSP paradigm, which does not include processes (Chow et al., 1995; Stank and Traichal, 1998; Stank et al., 2005; Stock et al., 1999). In these studies, the constructs of strategy and structure are defined in the logistics and SCM context. Chow et al. (1995), Stock et al. (1999) and Stank et al. (2005) individually define strategy as patterns of action plans designed for the purpose of achieving goals, competitive priorities that is chosen to excel in order to meet customer demands, and supply chain orientation that means the recognition of the systematic and strategic implications of the activities and processes involved in managing the various flows in a supply chain. While Galbraith and Nathanson (1978) and Miles and Snow (1978) focused on internal structure, structure in the logistics and SCM context implies distinguishing between internal structure and external structure. In terms of internal structure, some kinds of dimensions such as formalization and centralization are used (Chow et al., 1995; Stank and Traichal, 1998). Similarly, regarding external structure, various dimensions such as formalization, intensity, frequency, standardization, reciprocity, network structure, and geographic dispersion are adopted (Chow et al., 1995; Stock et al., 1999).

However, as will be shown in the results of literature review, a majority of the empirical studies on the relationship among strategy, structure, and/or processes in supply chains and performance focus on the relationship between processes and performance. This result may be natural because SCM is a concept that is dependent on a process view (Burgess, 1998). However, we consider that such a process-focused approach is not adequate to capture the variety of supply chain phenomenon. Process-focused studies have concluded that a higher degree of process integration leads to superior performance. On the other hand, as will be described in the discussion section, the optimum level of process integration in supply chains may depend on the patterns of

supply chain strategy. Specifically, a responsive supply chain requires a high degree of process integration, but more reasonable process integration may be desirable for an efficient supply chain. Namely, analyzing the SCM activities of firms along the SSPP paradigm, we can discuss the success factors of SCM comprehensively.

In order to discuss the SSPP paradigm in the SCM context, we need to accurately understand the research trend of empirical studies that examined all or part of the SSPP paradigm in the research area of SCM. Therefore, the authors conducted a literature review based on the following research question.

RQ: Applying the SSPP paradigm, which constructs have been used and what kind of variables have been adopted for each construct in the empirical studies on the relationship among strategy, structure, and/or processes in supply chains and performance?

The relevant literature was collected from major journals in the areas of logistics, operations, and supply chain management using EBSCOhost, Emerald, Science Direct, and the copy service of the library in the university where one of the authors works. Selected journals were the following seven:

- (1) *International Journal of Logistics Management (IJLM)*;
- (2) *International Journal of Operations & Production Management (IJOPM)*;
- (3) *International Journal of Physical Distribution & Logistics Management (IJPDLM)*;
- (4) *Journal of Business Logistics (JBL)*;
- (5) *Journal of Operations Management (JOM)*;
- (6) *Journal of Supply Chain Management (JSCM)*; and
- (7) *Supply Chain Management: An International Journal (SCM-IJ)*.

Most of these selected journals were highly ranked in the Journal Citation Reports (JCR) for 2010. For JOM, JBL, IJPDLM, SCM-IJ, and IJOPM, the impact factor was 5.093, 3.905, 2.617, 2.473, and 1.812. JSCM and IJLM were among the top five journals according to the impact factor rankings of ten SCM and logistics journals constructed by Chapman and Ellinger (2009). Therefore, these journals could be identified as leading ones in the areas of logistics, operations, and supply chain management.

We undertook a systematic search for papers published between 1996 and 2010 (a 15-year period) in these journals using the following criteria:

- the words “supply chain,” “supply management,” “strategy or strategies,” “structure,” “process or processes,” “performance,” “integrated,” “integrative,” “integration,” “collaborative,” “collaboration,” “cross-functional,” “involvement,” “interface,” and/or “relationship” are part of the title and/or included as the key words;
- the relationship among strategy, structure, and/or processes in supply chains and performance is the focus of the study;
- as the research methodology, a survey is employed;
- on strategy, observed variables measuring supply chain-related strategy such as patterns of action plans, competitive priorities, and supply chain orientation are included;
- on structure, observed variables measuring intra-organizational structure (e.g., organizational form and the degree of formalization and centralization) and/or inter-organizational structure (e.g., formalization, intensity, frequency, standardization, reciprocity, network structure, and geographic dispersion) are included;
- on processes, observed variables measuring intra-organizational integration mechanisms (e.g., information sharing), and/or inter-organizational integration mechanisms (e.g., joint planning) and/or reward system are included; and
- on performance, observed variables measuring operational performance (e.g., inventory turnover) and/or business performance (e.g., profitability) are included.

On the basis of these criteria, the authors gathered and reviewed the relevant papers separately in order to avoid research bias. We then discussed the validity of the selected papers, and the similarities and differences in distinguishing among strategy, structure, and/or processes. As a result, we excluded papers that analyze certain intra- and/or inter-organizational factor(s) such as capabilities/competencies, learning, trust, commitment, and power because these papers do not primarily examine the relationship among strategy, structure, and/or processes in supply chains and performance. In addition, papers that focus on certain program(s)/practice(s) such as just-in-time (JIT), electronic data interchange (EDI), vender-managed inventory (VMI), continuous replenishment program (CRP), collaborative planning, forecasting, and replenishment (CPFR), build-to-order (BTO), product modularity, mass customization, and e-business

are out of the scope of our study because these program(s)/practices(s) tacitly include particular strategy/structure and/or it is difficult to distinguish structure from processes.

Consequently, 78 relevant papers were selected from a total of 3,688 papers published in these journals. These papers formed the basis for the analysis presented here. Table 1 provides a synthesis of the selection and the distribution of the papers published from 1996 to 2010 in the seven journals.

Table 1 Distribution of selected papers

Selected journals / Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
<i>IJLM</i>																
Total number of papers	16	15	17	16	16	13	15	16	14	15	20	21	19	22	22	257
All or a part of the SSPP				1				2	1	1		1		1		7
<i>IJOPM</i>																
Total number of papers	87	72	73	68	74	82	72	66	59	63	54	59	51	52	50	982
All or a part of the SSPP					1	1	2			2	1	1	1	3		12
<i>IJPDLM</i>																
Total number of papers	45	34	44	36	53	41	47	42	46	42	43	41	41	40	42	637
All or a part of the SSPP	1		1							3	1		1	1	3	11
<i>JBL</i>																
Total number of papers	26	23	25	21	23	19	16	20	18	21	41	17	29	26	32	357
All or a part of the SSPP				1	3	1		1	2	1	1			3		13
<i>JOM</i>																
Total number of papers	24	21	41	36	30	37	39	22	35	36	49	85	51	33	39	578
All or a part of the SSPP				1	1	2	3	2	3	1	1	1	2		1	18
<i>JSCM</i>																
Total number of papers	23	23	21	29	26	27	29	16	19	20	20	18	30	27	25	353
All or a part of the SSPP				1	1					3	1	1			1	8
<i>SCM-IJ</i>																
Total number of papers	14	18	25	26	23	24	30	44	39	45	58	45	46	45	42	524
All or a part of the SSPP						1					2	2	1	2	1	9
Total for the seven journals																
Total number of papers	235	206	246	232	245	243	248	226	230	242	285	286	267	245	252	3,688
All or a part of the SSPP	1	0	1	4	6	5	5	5	6	11	7	6	5	10	6	78

2.3 Results

As shown in Table 2, along the SSPP paradigm, the authors classified the selected papers into six patterns on the basis of the relationship among the four constructs: strategy-performance, structure-performance, processes-performance, strategy-processes-performance, structure-processes-performance, and strategy-structure-processes-performance. In addition, the authors divided the organizational scope of the study into three types: internal studies (intra-organizational studies), external studies (inter-organizational studies), and both internal and external studies.

Apparently, most of the empirical studies belong to the pattern of processes-performance. This pattern accounts for about 56 percent of the empirical studies (44 of the 78). Half of these are external studies (22 of the 44). The second most frequent pattern is structure-processes-performance (17 of the 78). There were only a few studies

on patterns other than processes-performance and structure-processes-performance. There were only five papers on the strategy-structure-processes-performance pattern, which includes all the four constructs.

Table 2 Empirical base of the selected papers

Typology of the SSPP	Internal studies	External studies	Internal and external studies	Total
Strategy-performance	Lynch et al. (2000), Hallgren and Olhager (2009), Sun et al. (2009)		Rosenzweig et al. (2003), Wisner (2003)	5
Structure-performance	Germain et al. (2008)	Scannell et al. (2000), Benton and Maloni (2005), Vachon et al. (2009)	Vickery et al. (2003)	5
Processes-performance	Stank et al. (1999b), Ellinger et al. (2000), Hausman et al. (2002), O'Leary-Kelly and Flores (2002), Parente et al. (2002), Eng (2005), Chen et al. (2007), Daugherty et al. (2009)	Forza (1996), Spekman et al. (1998), Vonderembse and Tracey (1999), Das and Narasimhan (2000), Frohlich and Westbrook (2001), Stanley and Wisner (2001), Tracey and Tan (2001), Frohlich and Westbrook (2002), Bagchi and Skjoett-Larsen (2005), Closs et al. (2005), Fynes et al. (2005), Petersen et al. (2005), Simatupang and Sridharan (2005), Cassivi (2006), Cousins and Menguc (2006), Kannan and Tan (2006), Vereecke and Muylle (2006), Fawcett et al. (2007), Richey and Autry (2009), Defee et al. (2010), Tan et al. (2010), Wiengarten et al. (2010)	Vargas et al. (2000), Salvador et al. (2001), Stank et al. (2001), Closs and Savitskie (2003), Gimenez and Ventura (2003), Gimenez and Ventura (2005), Sanders and Premus (2005), Kim (2006), Carr et al. (2007), Lee et al. (2007), Author (2009), Chen et al. (2009), Handfield et al. (2009), Flynn et al. (2010)	44
Strategy-processes-performance		Carr and Pearson (2002), Bernardes (2010)		2
Structure-processes-performance		Stank et al. (1999a), Shin et al. (2000), Min and Mentzer (2004), Moberg et al. (2004), Prahinski and Benton (2004), Corsten and Felde (2005), Sengupta et al. (2006), Krause et al. (2007), Paulraj and Chen (2007), Carr et al. (2008), Hsu et al. (2008), Paulraj et al. (2008), Sezen (2008), Singh and Power (2009), Zacharia et al. (2009), Yigitbasioglu (2010)	Germain and Iyer (2006)	17
Strategy-structure-processes-performance		Carr and Pearson (1999), Chen and Paulraj (2004), Chen et al. (2004), Paulraj and Chen (2005)	Rodrigues et al. (2004)	5
Total	12	47	19	78

Regarding organizational scope, external studies comprise almost 60 percent of the studies (47 of the 78). As shown in Table 3, there are four kinds of inter-organizational relationships in this type: supplier-focal firm-customer (respondents are selected from focal firms), supplier-customer (respondents are selected from customers), supplier-supplier (respondents are selected from suppliers), and supplier-customer (respondents are selected from both suppliers and customers). The relationship on which the most papers are written is supplier-customer (respondents are selected from customers) (22 of the 47). There are many papers on the supplier-focal firm-customer relationship (18 of the 47). Compared to these relationships, the number of papers on

the supplier-customer (respondents are selected from suppliers) relationship is quite low (4 of the 47). These results mean that most of the external studies focus on the upstream or total supply chain rather than on the downstream alone.

Similarly, Table 4 shows the three kinds of inter-departmental relationships that are used in the eight internal studies on the processes-performance pattern. In these papers, the relationships between marketing (sales) and logistics or production (manufacturing) are mainly used. No study analyzes the impact on performance of processes among all the three functional departments of marketing, logistics, and production.

Next, we report the variables that have been used for the constructs of strategy, structure, processes, and performance. On strategy, a few papers use the construct (12 of the 78). As shown in Table 5, most of the papers focus on the strategic importance of a particular function such as purchasing (Bernardes, 2010; Carr and Pearson, 1999, 2002; Chen and Paulraj, 2004; Chen et al., 2004; Paulraj and Chen, 2005) or a particular activity such as external relationship or integration (Rodrigues et al., 2004; Rosenzweig et al., 2003; Wisner, 2003). Lynch et al. (2000) use two types of competitive strategies: process leadership and differentiation. However, these types imply business-level strategies rather than functional-level strategies. On the other hand, Sun et al. (2009) use four distinctive strategies for SCM: efficient, responsive, risk-hedging, and agile strategies. These strategies are cited from Lee (2002), which proposed using the framework of both demand and supply uncertainties. Similarly, Hallgren and Olhager (2009) use two kinds of supply chain strategies: lean and agile. Other than Sun et al. (2009) and Hallgren and Olhager (2009), there are few empirical studies that deal with functional-level strategies in the SSPP paradigm.

On internal structure, a few papers use the construct (4 of the 78). As shown in Table 6, as the observed variable, three-fourths of the papers use “(permanently) interdepartmental committee” that is set up to allow departments to engage joint decision-making on an ongoing basis (Germain and Iyer, 2006; Germain et al., 2008; Rodrigues et al., 2004) and “(temporary) cross-functional team” that is set up to facilitate inter-departmental collaboration on a specific project control (Germain and Iyer, 2006; Germain et al., 2008; Vickery et al., 2003). Half the papers use “(temporary) liaison personnel” that coordinates the efforts of several departments for the purpose of a specific project (Germain and Iyer, 2006; Germain et al., 2008). This result means that less attention has been paid in prior research to the existence, position, role, and responsibility of the SCM department.

Table 3 Inter-organizational relationships used in the external studies

Typology of inter-organizational relationship	Structure-performance	Processes-performance	Strategy-processes-performance	Structure-processes-performance	Strategy-structure-processes-performnace	Total
Supplier-focal firm-customer (respondents are selected from focal firms)		Forza (1996), Frohlich and Westbrook (2001), Frohlich and Westbrook (2002), Bagchi and Skjoett-Larsen (2005), Closs et al. (2005), Cassivi (2006), Kannan and Tan (2006), Vereecke and Muylle (2006), Fawcett et al. (2007), Defee et al. (2010), Tan et al. (2010)		Min and Mentzer (2004), Moberg et al. (2004), Sengupta et al. (2006), Hsu et al. (2008), Sezen (2008), Singh and Power (2009), Zacharia et al. (2009)		18
Supplier-customer (respondents are selected from customers)	Scannell et al. (2000), Vachon et al. (2009)	Vonderembse and Tracey (1999), Das and Narasimhan (2000), Stanley and Wisner (2001), Tracey and Tan (2001), Peterse et al. (2005), Cousins and Menguc (2006), Richey and Autry (2009), Wiengarten et al. (2010)	Carr and Pearson (2002), Bernardes (2010)	Shin et al. (2000), Corsten and Felde (2005), Paulraj and Chen (2007), Carr et al. (2008), Paulraj et al. (2008), Yigitbasioglu (2010)	Carr and Pearson (1999), Chen and Paulraj (2004), Chen et al. (2004), Paulraj and Chen (2005)	22
Supplier-customer (respondents are selected from suppliers)	Benton and Maloni (2006)	Fynes et al. (2005)		Stank et al. (1999a), Prahinski and Benton (2004)		4
Supplier-customer (respondents are selected from both suppliers and customers)		Spekman et al. (1998), Simatupang and Sridharan (2005)		Krause et al. (2007)		3

Table 4 Inter-departmental relationships used in the internal studies

Typology of inter-departmental relationship	Processes-performance	Total
Marketing (sales)-production (manufacturing)	Hausman et al. (2002), O'Leary-Kelly and Flores (2002), Parente et al. (2002)	3
Marketing-logistics	Stank et al. (1999b), Ellinger et al. (2000), Chen et al. (2007), Daugherty et al. (2009)	4
Cross-functional	Eng (2005)	1

Table 5 Latent variables of strategy

Latent variables	Total	Percent
Importance of strategic purchasing	6	50.0%
Importance of relational or integration strategy	3*	25.0%
Patterns of supply chain strategies	2	16.7%
Importance of SCM	1*	8.3%
Patterns of competitive strategies	1	8.3%

* Wisner (2003) uses two kinds of latent variables on strategy: importance of relational strategy and importance of SCM.

Table 6 Observed variables of internal structure

Observed variables	Total	Percent
(permanently) Interdepartmental committee	3	75.0%
(temporary) Cross-functional team	3	75.0%
(temporary) Liaison personnel	2	50.0%
Formal control	1	25.0%

On external structure, as shown in Table 7, most of the papers measure the degree of “long-term relationship” with trading firms (17 of the 25). The second most frequent variable is “buyer or supplier dependency” (6 of the 25). This variable also measures the degree of close relationship between buyer and supplier. Using these two variables, we can distinguish an arm’s length “transaction” from a collaborative “partnership” for an external relationship. The third most frequent variables are “supply base reduction” and “number of suppliers” (5 of the 25). These variables have been

adopted together with the variable of “long-term relationship” for the relationship between a finished goods manufacturer and the material suppliers.

Table 7 Observed variables of external structure

Observed variables	Total	Percent
Long-term relationship	17	68.0%
Buyer or supplier dependency	6	24.0%
Supply base reduction	5	20.0%
Number of suppliers	5	20.0%

On processes, there are several kinds of observed variables. Observed variables of internal processes are used in 23 papers. Table 8 shows the main variables. The most frequent variable is “resource sharing” such as sharing information, ideas, and facilities. The second most frequent variable is “working together” formally or informally through interaction and coordination, for example, through periodic meetings. Other variables often used are “joint planning” such as joint forecasting and operational planning, “integrated activities,” which means operational linkage or functional integration through integration of particular activities such as JIT, “joint decision” on particular activities such as ways to improve cost efficiencies, “joint establishment of objectives and/or goals,” and “joint development of the responsibilities' understanding.” The “process orientation” variable means shifting from managing functions to managing processes.

Table 8 Observed variables of internal processes

Observed variables	Total	Percent
Resource sharing	17	73.9%
Working together	11	47.8%
Joint planning	7	30.4%
Integrated activities	7	30.4%
Joint decision	6	26.1%
Joint establishment of objectives and/or goals	6	26.1%
Joint development of the responsibilities' understanding	5	21.7%
Process orientation	3	13.0%

In the same way, observed variables of external processes are used in 60 papers. Table 9 shows the main variables. Regarding external processes, “resource sharing” and “working together” are adopted in many of these papers. Other variables often used are

“integrated activities,” “joint planning,” “joint decision,” and “joint establishment of objectives and/or goals,” which are mainly used as the variables of internal processes as well. The variables “partner involvement” and “risk and/or reward sharing” are unique to external processes. The former means trading partners’ participation in a focal firm’s initiatives. The latter includes financing capital equipment and sharing research and development costs.

Table 9 Observed variables of external processes

Observed variables	Total	Percent
Resource sharing	41	68.3%
Working together	29	48.3%
Partner involvement	18	30.0%
Integrated activities	16	26.7%
Joint planning	10	16.7%
Risk and/or reward sharing	8	13.3%
Joint decision	7	11.7%
Joint establishment of objectives and/or goals	5	8.3%

Finally, the authors investigated the indicators of performance that were directly influenced by strategy, structure, and/or processes. Performance is originally a multi-dimensional construct. Since the impact on various kinds of performance has been examined in prior studies, a large number of observed variables are found to be used. These variables are roughly categorized into two groups: “operational performance,” which means the performance of operational activities such as logistics and production, and “business performance,” which means the performance that is synthetically led through various activities.

As shown in Table 10, more than 85 percent of the reviewed papers use “operational performance.” This is natural because SCM-related activities are operational. However, unexpectedly, almost 44 percent of the reviewed papers examine the impact on “business performance.” This result indicates that the researchers regard SCM-related activities as company-wide activities with strategic importance.

Table 11 presents the main observed variables for operational and business performance. As mentioned earlier, since there are many observed variables, these are ranked into sub-categories. The authors used five indicators as the sub-categories of operational performance: “quality/customer satisfaction,” “cost,” “lead time,” and “assets,” which are based on Handfield and Nichols (1999), and “flexibility/responsiveness,” which is often used in the reviewed papers. Business

performance is also divided into two sub-categories: “financial performance” and “market performance.” The percent is calculated by dividing the number of papers using each observed variable by the total number of papers (operational performance: 67, business performance: 34). Understandably, the main observed variables listed in Table 11 are well-known and familiar indicators.

Table 10 Ratio per category of performance

Category of performance	Total	Percent
Operational performance	67	85.9%
Business performance	34	43.6%

Table 11 Main observed variables on operational and business performance

Category of performance	Sub-category of performance	Observed variables	Total	Percent	
Operational performance	Quality/Customer satisfaction	Product quality/Conformance quality	29	43.3%	
		On-time delivery	26	38.8%	
		Delivery dependability	18	26.9%	
		Customer satisfaction	15	22.4%	
		Customer service	12	17.9%	
		Order fill rate/Stockout	9	13.4%	
	Cost	Cost	Cost	16	23.9%
			Logistics cost	12	17.9%
			Manufacturing cost	9	13.4%
			Purchasing cost	5	7.5%
	Lead time	Lead time	Delivery lead time	26	38.8%
			Product development lead time	9	13.4%
			Total lead time	5	7.5%
	Assets	Assets	Inventory turnover	16	23.9%
	Flexibility/Responsiveness	Flexibility/Responsiveness	Responsiveness to key customers	14	20.9%
			Volume flexibility	11	16.4%
Variety flexibility			9	13.4%	
Scheduling flexibility			6	9.0%	
Delivery flexibility			5	7.5%	
Business performance	Financial performance	Profitability	19	55.9%	
		Sales	15	44.1%	
		Return on assets	14	41.2%	
		Return on investment	14	41.2%	
	Market performance	Market performance	Market share	15	44.1%
			Competitive position	10	29.4%

3. Discussion

The authors arrived at the following observations from the literature review. As shown in Table 2, there are many papers on the relationship between supply chain processes and performance. These papers include several types of studies on organizational scope: internal, upstream external, downstream external, both upstream and downstream external, and both internal and external. Among these studies, there are

quite a few external ones. Since 2005, the number of both internal and external studies has been increasing (Author, 2009; Carr et al., 2007; Chen et al., 2009; Flynn et al., 2010; Gimenez and Ventura, 2005; Handfield et al., 2009; Kim, 2006; Lee et al., 2007; Sanders and Premus, 2005). Compared to external studies and both internal and external studies, there are relatively few internal studies. However, internal studies continue to attract researchers' attention (e.g., Daugherty et al., 2009). In addition, some of the external studies conduct their analyses from both supplier's and customer's perspectives (Krause et al., 2007; Simatupang and Sridharan, 2005; Spekman et al., 1998). Specifically, the respondents of these papers are selected from both suppliers and customers, although it is not easy for the researchers to gain the cooperation of both sides and to obtain sufficient responses. Further, the observed variables of the internal and the external processes tend to converge for some of the variables. These findings mean that many researchers in the field of SCM have focused on accumulating and increasing the scope of studies on the relationship between supply chain processes and performance.

However, prior studies have paid little attention to the impact on performance of the linkage between supply chain processes and other management elements, especially strategy and structure. Namely, very few published empirical studies on SCM have focused on the SSPP relationship. To address this gap, the authors attempt to develop a framework using the SSPP paradigm in the SCM context. Specifically, on the basis of the results of the literature review and some additional literature, we propose a framework that includes typical patterns of supply chain strategies and the main dimensions of the supply chain structure, processes, and performance.

On strategy, as described in the literature review results section, Hallgren and Olhager (2009) use two strategies: lean and agile. An efficient or lean supply chain for functional products, which supplies predictable products, reduces any kind of waste as much as possible, reduces costs through mass production, and provides customers with standardized products. A responsive or agile supply chain for innovative products, which always faces the volatile customer demand, responds to the changing market environment quickly, needs to maintain a higher capacity buffer to respond to the volatile market, and provides customers with personalized products. These two strategies are regarded as generic strategies because other researchers also adopt them (Narasimhan et al., 2006; Selldin and Olhager, 2007). On the other hand, Sun et al. (2009), referring to Lee (2002), employ not only efficient but also risk-hedging on functional products and distinguish between responsive and agile on innovative products for the degree of supply uncertainty. Further, theoretical and empirical studies

that deal with the hybrid strategy of lean and agile (so-called “leagile”) that seeks to improve both efficiency and responsiveness are increasing (Lo and Power, 2010; Mason-Jones et al., 2000; Naylor et al., 1999; Payne and Peters, 2004; Qi et al., 2009; Stavroulaki and Davis, 2010). These patterns of supply chain strategies have been mainly discussed in relation to product characteristics in order to test or expand Fisher’s model (Fisher, 1997). In the SSPP paradigm, these strategies need to relate to supply chain structure and processes.

Supply chain structure is divided into two kinds: internal and external structure. Regarding internal structure, as described in the literature review results section, prior studies use observed variables such as “(permanently) interdepartmental committee,” “(temporary) cross-functional team,” “(temporary) liaison personnel,” and “formal control.” Let us compare these variables with the dimensions of internal structure such as formalization and centralization (Chow et al., 1995; Stank and Traichal, 1998). Using Kim’s (2007) definition, which is a valuable study concerning organizational structure in the SCM context, formalization is defined as the degree to which decisions and working relationships for SCM activities are governed by formal rules and standard policies and procedures. Similarly, centralization is defined as the degree to which the power to make SCM decisions is concentrated in an organization. The existence of an interdepartmental committee means high formalization and centralization because interdepartmental decision-making is conducted through the committee’s coordination. Formal control is a variable that measures the degree of formalization. On cross-functional team and liaison personnel, we cannot evaluate the degree of both formalization and centralization because these are temporary team or role for a specific project and are not part of operational decision-making.

Regarding formalization, according to Kim (2007), an SCM-oriented organization is highly formalized. Therefore, we can understand that high formalization is always required in SCM activities regardless of the patterns of supply chain strategies. However, little has been published on the relationship between centralization and efficiency and/or responsiveness. Rather than using these dimensions, the relationship between organizational forms and efficiency and/or responsiveness is proposed in the field of organizational design. Specifically, as is widely known, functional structure focuses on efficiency on the basis of more scale and specialization. On the other hand, there is recent support for the idea that market structure, such as a customer-focused one, can improve responsiveness on the basis of product or service unique to segment through superior market segment knowledge and information (Galbraith, 2002). These

propositions on the relationship between supply chain strategy and internal structure need to be examined in the SCM context.

Regarding external structure, prior studies mainly use the observed variables related to the degree of “long-term relationship,” “buyer or supplier dependency,” and “supply base reduction.” The authors believe that upstream structure with suppliers and downstream structure with customers should be distinguished. Regarding upstream structure, according to Qi et al. (2009), firms that adopt lean strategy need to maintain a long and rigid relationship with a small number of suppliers, and seldom change the structure. On the other hand, firms that adopt agile strategy need to maintain a short and flexible relationship with a large number of suppliers, and often change the structure in order to cope with a volatile market. Stavroulaki and Davis (2010) also mention that cooperative relationships in lean supply chains are possible due to the large-volume, long-term commitments that can be made among the manufacturer and its suppliers. In addition, they describe that make-to-order manufacturers must have a sufficiently flexible supply base to be able to explore alternative sources of raw materials that may be required for certain orders. Therefore, it is tentatively hypothesized that efficient supply chain has reduced supply base, higher buyer-supplier dependency, and longer-term relationship. Conversely, responsive supply chain has flexible supply base, lower buyer-supplier dependency, and shorter-term relationship. However, for example, there has been insufficient discussion regarding whether firms that adopt responsive strategy with low dependency and short-term relationship can actually maintain and improve the performance of flexibility, and if so, how.

Regarding the relationship between supply chain strategy and downstream structure, there is very little detailed discussion in the extant literature. As shown in Table 3, most of the external studies focus on the upstream or total supply chain rather than on the downstream. Two cases in Fisher (1997) give us some hints on downstream structure. Campbell, a canned-soup manufacturer and a case of efficient supply chain, launched the continuous replenishment program (CRP) with its most progressive retailers in order to cut costs. This program worked by electronic data interchange (EDI) links. Specifically, the retailers informed Campbell about their demand and the level of inventories. Campbell used that information to forecast future demand and to determine the volume of replenishment based on upper and lower inventory limits previously established with each retailer. Sport Obermeyer, a fashion skiwear manufacturer and a case of responsive supply chain, solicited early orders from its 25 largest retailers among 800 specialty retailers in order to reduce uncertainty. The company invited these retailers to its head-office each year to evaluate its new product line. As a result, this

company could forecast the national demand for all its products with a margin of error of just 10 percent. Comparing Campbell's case to that of Sport Obermeyer, and referring to Lee (2002), it may be able to be concluded that a firm that adopts efficient supply chain develops a standardized partnership with its main customers in order to eliminate non-value-added activities. On the other hand, a firm that adopts responsive supply chain develops a customized partnership with its main customers in order to meet highly personalized requirements. In other words, based on the framework proposed by Stavroulaki and Davis (2010), efficient supply chain has smaller number of customer segments. On the other hand, responsive supply chain has larger number of customer segments. However, these propositions have not been empirically examined yet.

The construct of supply chain processes is also divided into two: internal and external processes. Very little has been written on the relationship between the two generic strategies and internal processes. Exceptionally, Ramdas and Spekman (2000) found that innovative-product supply chains were more closely integrated than functional-product supply chains in production planning and control, in quality management, and even in service and after-sales support. On the basis of their empirical findings, we will consider the relationship. As shown in Table 8, "resource sharing" is the most frequent variable. In efficient supply chain, it is enough to share formalized information (e.g., forecast, shipment, inventory, production, and purchasing data) among the SCM-related departments because its supply chain deals with functional products with predictable demand. On the other hand, in responsive supply chain, both formalized and function-specific information (e.g., factors of demand fluctuation owned by sales department and operational constraints owned by production department) need to be shared because its supply chain deals with innovative products with unpredictable demand. Regarding the second and third most frequent variables, "working together" "joint planning," and "integrated activities" in efficient supply chain, it may be hypothesized that these degrees are relatively low because internal processes are connected according to a schedule that is established in advance. In contrast, in responsive supply chain, it may be assumed that these degrees are relatively high because internal processes include activities that involve adjusting the deviations from forecast and plan when contingencies arise. It is desirable that such relationships between supply chain strategy and internal processes are analyzed in relation to the three functional departments of marketing, logistics, and production.

On external processes, as shown in Table 9, the first, second, and third most frequent variables are "resource sharing," "working together," and "partner

involvement.” In efficient supply chain that implements a program such as the CRP adopted in Campbell’s case (Fisher, 1997), the focal manufacturer needs to share formalized information such as inventory status with its main customers/suppliers. It may be hypothesized that the degrees of both working together and partner involvement are relatively low because this program is operated on the basis of previously established procedures and rules. On the other hand, in responsive supply chain, as shown by the case of the agile supply chain at Nokia (Collin and Lorenzin, 2006), the focal manufacturer is required to build its customer-driven planning and executing processes. Namely, the focal manufacturer needs to share not only formalized information but also partner-specific information such as each customer’s demand. In order to operate its customer-driven planning and executing processes, it may be supposed that the degrees of both working together and partner involvement are inevitably higher.

However, these relationships between supply chain strategy and internal and external processes are nothing more than theoretical hypotheses. Therefore, these need to be empirically verified.

Finally, regarding performance, the authors use operational performance because most of the reviewed papers use it rather than business performance. As shown in Table 11, the observed variables of operational performance are divided into five sub-categories: “quality/customer satisfaction,” “cost,” “lead time,” “assets,” and “flexibility/responsiveness.” On the relationship between supply chain strategy and operational performance, Mason-Jones et al. (2000) propose that efficient supply chain must be highly competitive at the market qualifier metrics, which means the minimum standard for entry into the marketplace, that is, quality, lead time, and service level, and excel at the market winner metrics, that is, cost. On the other hand, in responsive supply chain, the market qualifier metrics are quality, cost, and lead time. Such a supply chain must excel at service level competition.

Their propositions have been tested by a few empirical studies. Hallgren and Olhager (2009) found that lean strategy was significantly related to manufacturing cost, product quality, on-time delivery, and delivery lead time. Similarly, they showed that agile strategy was significantly related to product quality, on-time delivery, and delivery lead time, but the relationship between agile strategy and manufacturing cost was not significant. These results are consistent with Mason-Jones et al. (2000). In addition, Hallgren and Olhager (2009) analyzed the relationships between lean and agile strategies and variety and volume flexibility dimensions. As a result, they found that these relationships were statistically significant, and both flexibility dimensions were

stronger for agile than for lean. This result implies that flexibility is a market qualifier metric for lean supply chain and is a market winner metric for agile supply chain.

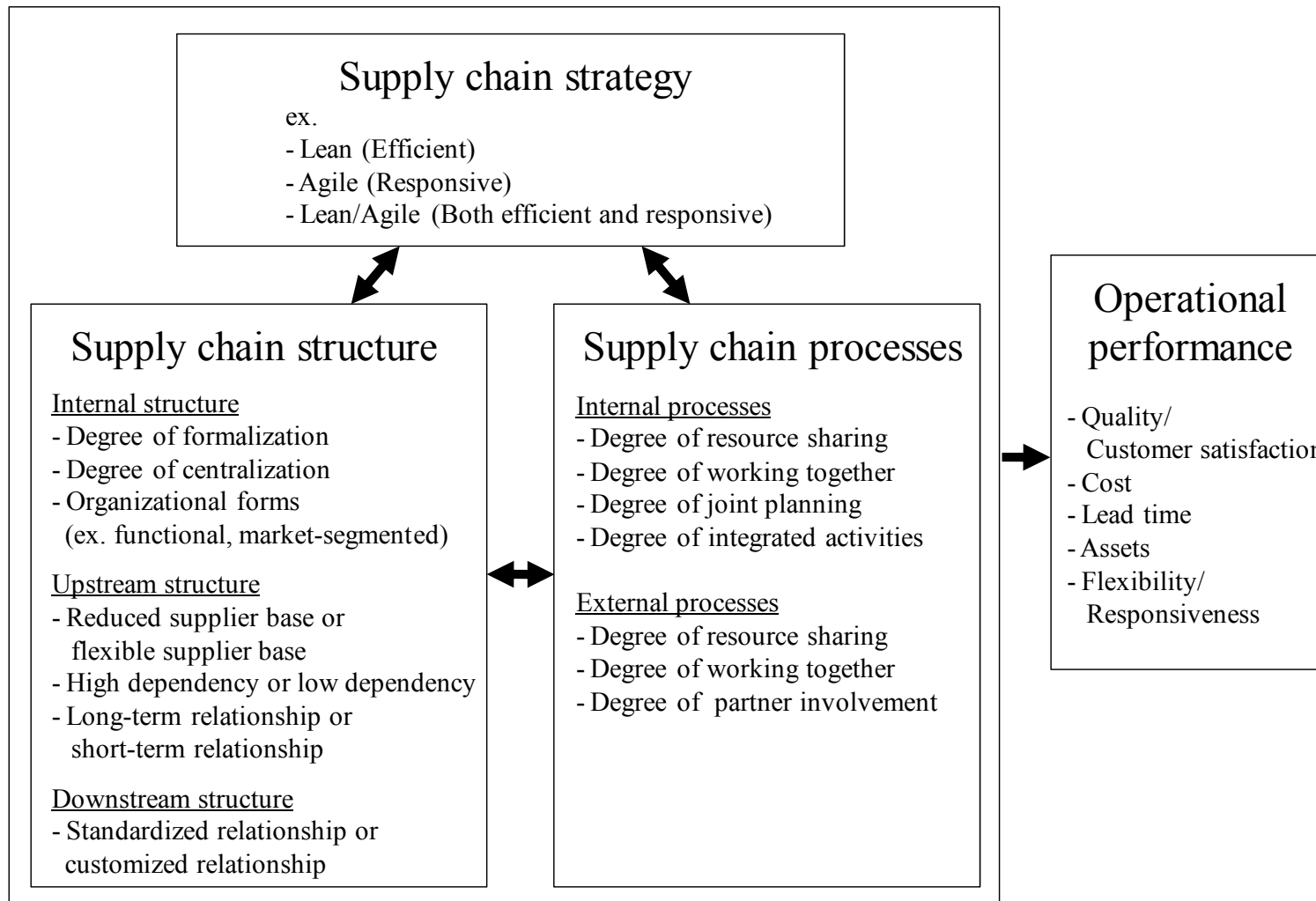
Qi et al. (2009) analyzed the relationships between four supply chain groups: Traditional, Lean, Agile, and Lean/Agile, and two latent variables of operational performance: customer service and operating cost. Their results showed that the Lean group has significantly better operating cost than the Agile group, but the Agile group does not have better customer service than the Lean group. The former result is consistent with Mason-Jones et al. (2000), but the latter is not. Comparing with Table 11, the latent variable of customer service includes several kinds of operational performance indicators: quality/customer satisfaction (product quality, customer service, and delivery dependability), lead time (delivery speed), and flexibility (responsiveness to customers, volume flexibility, and product mix flexibility). More empirical research is needed to examine the relationship between supply chain strategy and narrow customer service, which does not include product quality, lead time, and flexibility. Further, they found that the Lean/Agile group was the best performing one on both customer service and operating cost. This is an empirical result for the theoretical proposition that firms with the hybrid strategy of lean and agile seek to improve both efficiency and responsiveness.

On the basis of the above description, each construct of the SSPP paradigm was set up in the SCM context. Figure 1 is a framework that includes typical patterns of supply chain strategies and the main dimensions of the supply chain structure, processes, and performance.

4. Implications and future research

In this paper, the authors conducted a review of relevant papers published in major journals in the areas of logistics, operations, and supply chain management in order to investigate the degree to which empirical studies on the impact on performance of strategy, structure, and/or processes in supply chains apply the SSPP paradigm. As a result, it was found that most of the previous empirical studies tended to focus on the relationship between supply chain processes and performance. Consequently, the authors did not find empirical studies using the essential SSPP paradigm proposed by Galbraith and Nathanson (1978) and Miles and Snow (1978). This result implies that while the paradigm is classical in the fields of strategic management and organizational design, it is still unexplored in the field of SCM. Though this result is found from a literature review of the limited journals, it does suggest that researchers in the field of SCM have not sufficiently discussed the relationship between *fit* among the main

Figure 1 A framework of the SSPP paradigm in the SCM context



management elements such as strategy, structure, and processes and performance.

On the basis of the results of our literature review, we proposed a framework applying the SSPP paradigm in the SCM context. As far as the authors are aware, this paper is the first that incorporates typical patterns of supply chain strategies and the main dimensions of the supply chain structure, processes, and performance that have been fragmentarily discussed in prior studies into a SCM-related SSPP framework. Using the framework, researchers could discuss the success factors of SCM more comprehensively. In addition, while Galbraith and Nathanson (1978) and Miles and Snow (1978) focused on internal activities, our framework includes the dimensions of not only internal structure and processes but also external structure and processes. Consequently, it is useful to understand more wide-ranging phenomena in supply chains.

The framework also has important implications for practitioners. In process-focused studies, managers are encouraged to integrate supply chain processes internally and externally in order to improve operational performance. However, our framework implies that managers should match supply chain processes with supply chain strategy and structure. Specifically, although it has not been tested by empirical studies, firms that adopt lean strategy need to share formalized information internally and externally in functional organization and standardized relationship with the firms' main customers. On the other hand, firms that adopt agile strategy need to share both formalized and function/partner-specific information internally and externally in market-segmented organization and customized relationship with their main customers. That is, managers are required to design strategy, structure, and processes in supply chains synthetically rather than merely to integrate supply chain processes.

Future research will need to conduct empirical studies using the SSPP paradigm. Our framework does not clarify the patterns of structure and processes that match with different kinds of supply chain strategies such as lean, agile, and hybrid of lean and agile. We expect these patterns to be found through case studies that deal with the research question of how a high performance firm realizes a fit among strategy, structure, and processes in supply chains. Further, we need to develop specific hypotheses on the impact of the linkage between strategy, structure, and processes in supply chains on performance, and examine these hypotheses using survey methodology. Such empirical studies will help deepen the understanding of the complex phenomena in supply chains.

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