

Applying the strategy-structure-performance paradigm to the supply chain environment

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Abstract

Purpose – The paper extends a central paradigm of the strategy literature to the supply chain environment to foster a better understanding of the elements characterizing strategic decisions that lead to supply chain structural development and performance.

Design/methodology/approach – Strategic literature is reviewed to provide a fuller explanation of the strategy-structure-performance (SSP) research stream. SSP foundational principles are linked to supply chain management concepts, and synthesized into an explanatory framework. Propositions for future research are presented based upon the framework.

Findings – An iterative relationship among internal firm strategy, structure, and performance measurement systems is indicated, implying that firm supply chain strategy should be complementary with that of supply chain partners.

Research limitations/implications – The paper presents a content analysis of existing research and a conceptual framework emerging from it. No data were collected nor were research propositions tested.

Practical implications – The primary implication is “know your supply chain partners”. Do their strategies mesh – either as consistent or complementary – to your own firm’s supply chain strategy? Strategic alignment is a necessary precursor to deployment of an effective supply chain structure.

Originality/value – The paper shows that SSP theory can be extended beyond the firm to the complex supply chain environment.

Keywords Supply chain management, Strategic management, Decision making

Paper type Research paper

Companies searching for a way to sustain competitive advantage in the 1980s invested heavily in efficient business approaches like just-in-time, total quality management, and reengineering designed to optimize the performance of certain firm processes. Firms discovered, however, that the performance advantages obtained from such methods were quickly reduced as competitors implemented similar approaches (Atkinson, 1986; Bechtel and Jayaram, 1997; Boghossian, 1988; Schonberger, 1982; Teece, 1981). Further, significant performance enhancements associated with these techniques were not achievable without the cooperation of supplier, and in some cases, customer firms.

The realization that optimization of single firm operations does not result in appreciable system improvements led many firms to seek closer coordination and integration with suppliers than was possible in transactional buyer-seller relationships. Multiple firms working together through shared goals and integrated processes may improve the performance of each of the individual members. Hence, the supply chain concept was born (Gruen, 1997; Weigand, 1968; Ellram and Cooper, 1990).



The concept focuses strategy on developing differential advantage through supply chain related capabilities. We will term this supply chain strategy.

The Council of Supply Chain Management Professionals (CSCMP, formerly The Council of Logistics Management (CLM)), an influential professional organization focused on supply chain management (SCM) practice and education, provides the following definition of SCM:

Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Supply Chain Management integrates supply and demand management within and across companies (www.cscmp.org).

Recent academic research supports the view of SCM as a strategic level concept (Bowersox *et al.*, 1999; Cooper *et al.*, 1997; Mentzer, 2001), emphasizing a multi-firm focus on creating strategic differential advantage by maximizing the total value delivered to end-customers.

The objective of this paper is to facilitate a strategic understanding of SCM decision-making. Strategic management literature provides a theory that can be adapted to this task. The strategy-structure-performance (SSP) paradigm predicts that a firm's strategy, created in consideration of external environmental factors, drives the development of organizational structure and processes (Galbraith and Nathanson, 1978; Galunic and Eisenhardt, 1994; Miles and Snow, 1978). This strategy-structure combination will allow the firm to perform at a desired level. Those firms with aligned strategy and structure are expected to perform better than competitors who lack the same degree of strategic fit (Galbraith and Kazanjian, 1986; Miles and Snow, 1984). SSP research to date, however, has been focused at the level of the individual firm and not on the supply chain. The central purpose of this paper is to extend the strategy literature to the supply chain environment to foster a better understanding of the elements characterizing strategic decisions that lead to supply chain structural development and performance.

This manuscript consists of three parts. First, key strategic literature is reviewed to provide a fuller explanation of the SSP research stream. Second, the SSP foundational principles are linked to SCM concepts, and synthesized into an explanatory framework. Propositions for future research are presented based upon the framework. Third, a suggested future research direction is reviewed, and implications of the framework for academics and practitioners are described.

Background and literature review

The following overview of the SSP paradigm from the strategic management literature is intended to provide a foundation in preparation for extension into a supply chain framework presented in a later section of the manuscript. In addition, previous use of SSP theory in a supply chain logistics context is described.

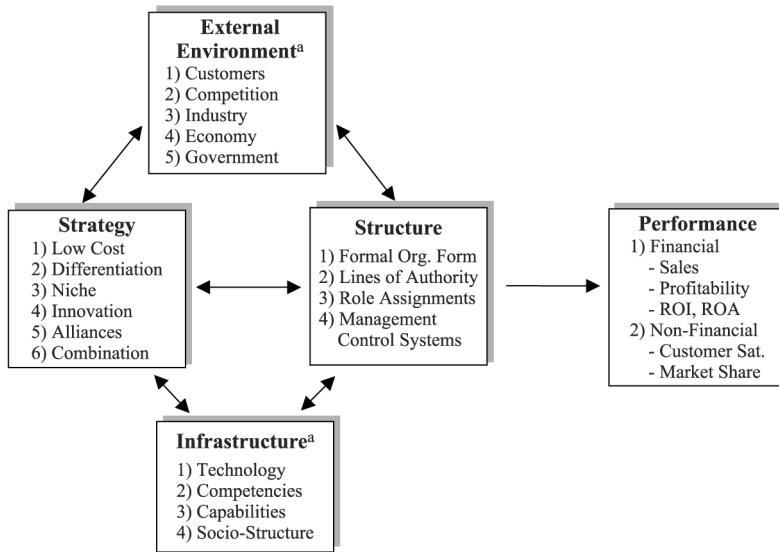
The relationship between strategy and structure was first described by business historian Chandler (1962) in his review of the growth and development of four large US firms: du Pont, General Motors, Standard Oil of New Jersey, and Sears, Roebuck and Company. He found that as each of these companies grew through a strategy of product diversification they implemented a divisional organizational structure.

Chandler's discovery was supported and extended with several studies of western European and multi-national firms (Channon, 1973; Dyas and Thanheiser, 1976; Egelhoff, 1988; Franko, 1976; Stopford and Wells, 1972).

Rumelt (1974) further expanded on Chandler's work in a study of the financial performance of over 200 Fortune 500 companies from 1949-1969. The resulting research showed that certain strategy and structure combinations significantly outperformed others. Firms diversifying into a related product line or business, for example, showed consistently better performance than either firms diversifying into unrelated businesses or vertically integrated firms with limited diversification options. Other authors subsequently confirmed Rumelt's findings while looking at different structural types, and using stock market return as a performance measure (Hoskisson, 1987; Lubatkin and Rogers, 1989; Teece, 1981; Williamson, 1975). Current thought has centered on the need for congruency between the firm's strategy and structure. The alignment, or fit, of strategy and structure is considered a baseline requirement for organization performance (Galbraith and Kazanjian, 1986; Miles and Snow, 1978). In fact, at least a minimal fit is viewed as a requirement for firm survival (Miles and Snow, 1984). Furthermore, more recent research stresses that external and internal contingency factors should be considered when developing and deploying updated strategies (Galunic and Eisenhardt, 1994; Miller, 1988; Porter, 1985, 1980; Stimpert and Duhaime, 1997).

Extending SSP into the supply chain context hinges on the suggestion that competition is found at the supply chain level rather than the company level (Christopher, 1992). The shift in the unit of analysis from the firm to the supply chain is evidenced by the attention directed toward SCM and supply chain strategies by many of the discipline's most accomplished scholars (Bowersox *et al.*, 2002; Christopher and Ryals, 1999; Lambert *et al.*, 1998; Mentzer, 2001). Chow *et al.* (1995) described the need for an appropriate organizational structure extending across firm boundaries to the whole supply chain; however, the authors warned that finding the best structure was contingent on the situation. Stock *et al.* (1999) developed a framework of enterprise logistics strategy and structure based on a contingent SSP, or structure-conduct-performance (Porter, 1985, 1980), theoretical foundation. The authors noted logistics operations increasingly compete at the supply chain level, but maintained a firm-level focus in their manuscript. Other authors have similarly linked supply chain strategy and structure to improved performance outcomes (Rodrigues *et al.*, 2004; Stank and Traichal, 1998).

Figure 1 provides the authors' summary of key concepts that have been widely investigated in SSP literature. It demonstrates the relationships among strategy, structure, and performance and identifies characteristics that lie outside the purview of strategy and structure yet have an influence on them. The strategies listed include Porter's well-known classification of low cost, differentiation, and niche, plus strategies proposed by other authors including technology standardization and innovation, and business network alliances (Achrol, 1997; Galunic and Eisenhardt, 1994; Porter, 1980; Varadarajan and Jayachandran, 1999). Additionally, Bartlett and Ghoshal (1991) have noted that firms routinely combine multiple strategies. Structure centers on the design of an organization through which the enterprise is administered, including the lines of authority and communication between the different administrative elements of an enterprise as well as the information and data that flow through these lines of



Note: ^aContingent factors

Figure 1.
The SSP paradigm

communication and authority. In addition to formal lines of authority and information flows, structure includes allocation of work into roles, techniques of coordination, relationships among organizational subunits, methods of reward and punishment, policies and activities occurring within an organization, and social and political networks (Chandler, 1962; Dalton *et al.*, 1980; Galbraith and Nathanson, 1978; Miles and Snow, 1978; Rumelt, 1974). The alignment, or fit, of strategy and structure is considered a baseline requirement for organization performance, including both financial (e.g. revenue, profit, and ROI) and non-financial (e.g. customer satisfaction and market share) assessments (Galbraith and Kazanjian, 1986; Miles and Snow, 1978).

While research has supported a significant relationship between strategy and structure alignment and firm performance, it is recognized that performance is influenced by contingent factors that lie beyond the realm of strategy and structure. These contingent factors can be categorized as either external environmental factors or infrastructure. Environmental factors include customer requirements, competitors and industry structure, and general economic and government controls (note that for supply chains this often entails the legislation and trade policies of multiple countries) (Christensen and Montgomery, 1981; Porter, 1985, 1980). Infrastructure is considered to be the underlying map of interdependencies an organization confronts as it struggles to engage in and maintain its activities over time. Infrastructure includes the firm's technology and systems, core competencies, capabilities, and socio-structure or firm culture (Day, 1994; Fombrun, 1986; Prahalad and Hamel, 1990; Thompson, 1967).

Applying strategic management theory to SCM

No satisfactory overarching theory has been presented to guide supply chain development. There are at least three reasons for this lack of a theoretical foundation.

First, the supply chain field is a relatively new one, with much of the work to date centered around describing the supply chain phenomenon (Bechtel and Jayaram, 1997; Bowersox and Closs, 1996; Bowersox *et al.*, 1999; Cooper *et al.*, 1997). Second, while supply chains have taken on an increasingly strategic role in the competitive arsenal of many companies (Rodrigues *et al.*, 2004; Slone, 2004), the design and deployment of supply chains to achieve a competitive advantage is a dynamic process. The rapidly evolving nature of the phenomenon has thus far proven to be a difficult challenge for scholars to understand, predict and control with any measure of consistency (Hunt, 1991; Mentzer, 2001). Finally, much of the supply chain research conducted during the past dozen years have been processed versus strategically focused (Cooper *et al.*, 1997; Croxton *et al.*, 2001). The process literature is beneficial to practitioners, and may provide the foundation of broader supply chain theory. Much of this work, however, tends to be limited to description of the process steps themselves and has not been linked back to the strategies that drive company decision-making.

Since SCM is becoming increasingly strategic for companies, and strategies must be modified over time in light of market and competitive pressures (Hunt and Morgan, 1995; Christopher and Towill, 2002), the study and practice of the phenomenon will doubtlessly continue to change in the coming decade. Further development of theory tying supply chain activities to strategic management thought will enable researchers to better understand supply chain strategies and the decisions that lead to structural evolution over time. Cooper *et al.* (1997), Christopher and Towill (2002) and Christopher and Ryals (1999), for example, highlight SCM as the integration of key business processes across the supply chain for the purpose of adding value for customers and stakeholders. This definition is further supported by research emerging from The Global Supply Chain Forum at The Ohio State University (Lambert, 2004). Mentzer (2001, p. 18) considers SCM to be “the systemic, strategic coordination of the traditional business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole”. Bowersox *et al.* (2002) state that SCM consists of firms collaborating to leverage strategic positioning and improve operating efficiency.

Each definition presented above emphasizes the collaborative, multi-firm nature of supply chain arrangements. Complex structures are inherent in such arrangements. The multitude of suppliers, systems, product handling requirements, transportation options, and customer requirements makes every supply chain unique in some way. Theories from many disciplines have been applied to the supply chain environment; however, each has limitations in light of the complexity found in supply chains. Some theories are relevant, but incomplete in their scope. Purchasing theories, for example, focus on the “supply side” only – inbound to manufacturing (Halley and Nollet, 2002; Handfeld, 1993). Marketing channels theory (Bucklin, 1965; Achrol *et al.*, 1983; Frazier, 1999) tends to address the “demand side” only – outbound from manufacturing to the consumer. Relationship theories from psychology and marketing such as power-dependence, trust-commitment, bargaining or negotiation, and governance have been developed on dyadic cases and empirical evidence (Cannon and Perreault, 1999; Doney and Cannon, 1997; Emerson, 1962; Heide, 1994; Iyer and Villas-Boas, 2003; Rinehart *et al.*, 2004; Rinehart and Page, 1992). Strategic management theories such as the resource-based view (Barney, 1991; Wernerfelt, 1984) have been bridged to supply

chain operations disciplines by several authors (Carter and Ellram, 2003; Fawcett *et al.*, 1997; Lawson, 2003; Lynch *et al.*, 2000) but have been generally applied to the capabilities developed by an individual firm rather than supply chain wide. Structure-conduct-performance theory has also been targeted at the decisions made at the individual firm level (Porter, 1985, 1980). Transaction cost economics deals with bilateral organization governance structures, and while relevant to the supply chain does not encompass the broader multi-firm domain (Williamson, 1975, 1985). Options theory is similarly oriented toward defining governance rules under conditions of varying uncertainty (Kogut, 1991). General systems theory provides an adequate framework for analysis of supply chains, but may not be robust enough to consider the behavioral elements inherent.

Strategy in the supply chain

Several authors in the logistics discipline have hypothesized that the SSP relationship is applicable to the supply chain environment (Bowersox *et al.*, 1999; Chow *et al.*, 1995; Rodrigues *et al.*, 2004; Stank and Traichal, 1998). Taking lessons from the strategic management literature and extending them to the multi-entity setting of the supply chain provides several logical elements to consider when managers seek to improve performance in their supply chains. The concept of strategic fit (Brewer and Speh, 2001; Galbraith and Nathanson, 1978; Lambert and Pohlen, 2001; Miles and Snow, 1984; Stank *et al.*, 2001) appears to be directly transferable to the supply chain. Strategy must be consistent across all supply chain members. This does not imply that each firm's strategy needs to be the same. Such a requirement would be much too confining to be practical. Rather, the strategies should be complementary across firms to mutually support an overall, shared supply chain objective.

Supply chain strategy differs from traditionally accepted company strategies in that it requires the coordination and commitment of multiple firms to implement company strategic objectives. Traditional business unit-level strategies including low cost, product distinctiveness, and/or innovation, require internal functional coordination; supply chain strategy requires companies to reach objectives through inter-firm coordination. Supply chain strategy utilizes inter-firm coordination as the capability that facilitates achievement of objectives focused on revenue growth, operating cost reduction, working capital and fixed capital efficiency to maximize shareholder value (Christopher and Ryals, 1999). The essence of supply chain strategy emerges from research focusing on the impact of interorganizational relations on marketing strategy. Interorganizational relationship literature introduced the concept of strategic business network alliances to characterize the relationship formed between multiple firms linked together in support of a common goal (Achrol, 1997; Varadarajan and Jayachandran, 1999).

The interorganizational relationship phenomenon has appeared in logistics research using the term relational strategy (Rodrigues *et al.*, 2004). A relational strategy requires that firms create structures and processes that improve cross-organizational behavior between supply chain partners that share a common vision and objectives. This collaborative perspective is key to aligning the operational processes of multiple firms into an integrated supply chain system. The objective of the approach is to enable a firm to compensate for its weaknesses and/or resource constraints by linking with other firms having offsetting strengths, thereby allowing all firms to apply their

resources toward areas that are seen as important. In such relationships, shared supply chain goals across participating supply chain firms heighten the chances of success. For example, a consumer goods manufacturing firm with a strategy focused on providing the highest quality products in the industry should seek logistics providers and retail partners that differentiate themselves from competitors by providing the highest levels of supply chain services such as on-time and consistent delivery and on-shelf availability.

Another key dimension of supply chain strategy includes identification of firms that share a mutual belief in the value of the supply chain as a competitive differentiation mechanism. Establishing ties to other firms that do not value the supply chain as highly will reduce the effectiveness of the supply chain (Ellram, 1995). The Japanese *keiretsu* structure provides an early demonstration of multiple firms using supply chain strategies to achieve a common purpose (Schonberger, 1982; Sugimori *et al.*, 1977). While *keiretsu* differs from typical cross-organizational structure because there is frequently some degree of vertical ownership implied between the organizations, it does offer a meaningful analogy for establishing ties with firms that hold a mutual belief in the role of the supply chain. In *keiretsu*, suppliers of automotive and electronic sub-components enjoy close ties with manufacturers, often exchanging personnel, technology, information, and capital in order to secure high volume, long-term supply contracts with the manufacturer. Uniquely, the supplier is frequently a spun off division of the manufacturer.

Other applications of supply chain strategy occur in supply chains supporting a powerful supply chain leader. Often a leader firm in a position of power will define the rules the supply chain will play by; these rules may not be in the best interests of other members. Alternatively, a strong leader firm may use its power to influence, rather than dominate, the supply chain behaviors of other firms; in either case the leader's power will influence the other members of the supply chain, with either a beneficial or injurious effect depending on the power bases used. Positive uses of power tend to lead to stronger supply chain relationships, which in turn lead to improved performance (Ellram and Cooper, 1990; Maloni and Benton, 2000; Mentzer, 2001).

Structural elements of the supply chain

A central element of the SSP paradigm centers on the need for congruency between the firm's strategy and structure; in fact strategic fit is considered a baseline requirement for organization performance (Miles and Snow, 1984). Following this theoretical logic, therefore, it follows that firms that pursue supply chain strategy must seek to develop structures that support such a strategy.

The extension of the SSP paradigm to supply chain structure centers on the definition of the supply chain as the focal enterprise. Integration, both within the firm and across supply chain members is a central theme required for effective coordination of activities across multiple firms. Integration and the similar concepts of synchronization and harmonization entail the common use of materials and systems to create timely, high quality product and information flows that drive enhanced performance. Thus supply chain structure implies the integration of the organization governing the network of supply chain members and the links between members through which the enterprise is administered (Lambert *et al.*, 1998). A lack of integration may lead to the failure of multiple partners attempting to work together

(Brewer and Speh, 2000; Bowersox *et al.*, 1999; Chow *et al.*, 1995; Mollenkopf *et al.*, 2000; Williams *et al.*, 1997). SSP denotes that structure may be adapted to support the desire of tighter integration across members. Critical elements of structure including technology, communications, standards, decision-making authority, and reward systems can be applied to the supply chain environment to become foundational elements of the SSP supply chain framework (Cooper *et al.*, 1997; Droge and Germain, 1989; Mentzer, 2004; Mollenkopf *et al.*, 2000; Rodrigues *et al.*, 2004; Stank and Traichal, 1998). Each will be examined in the following paragraphs.

Technology integration is the coordination of systems and relevant data (Choy *et al.*, 2003). Systems coordination entails the capability to exchange information with internal and external firm supply chain members in a timely, responsive, and usable format. Internal coordination of information allows a single manager to coordinate internal resource deployment; accessibility to data across the supply chain facilitates inter-organizational synchronization and improved resource use. For example, when retailers and manufacturers invest in technology that enables them to share data on item sales at store level by time of day, coordinated inventory availability and deployment become a possibility (Bowersox *et al.*, 1999).

Technology integration also is characterized by high levels of system flexibility at the points of integration between members. System flexibility enables firms to manipulate supply chain data sets prior to interfacing with core transaction processing systems to enable a firm to more easily link with multiple supply chain members using different data transaction sets and formats and/or to accommodate systems and transaction format changes over time. System flexibility facilitates changing customer, product and partner system requirements, and is associated with improved supply chain performance (Cooper *et al.*, 1997; Rodrigues *et al.*, 2004; Stevens, 1989). Coordination and flexibility help ensure that real time information from across the supply chain is available to support decision-making (Rabin, 2003). The relationship between supply chain strategy and technology integration is presented as *RPI*:

- RPIa.* A firm that adopts a supply chain strategy will demonstrate a high level of computer systems technology coordination across supply chain entities.
- RPIb.* A firm that adopts a supply chain strategy will demonstrate a high level of computer systems technology flexibility across supply chain entities.

Supply chain decisions have often been fragmented due to data inconsistency. This inconsistency may result from independently developed information systems characterized by fragmented and redundant data. Operational decentralization and geographical dispersion of facilities adds to the difficulty. The problems that have resulted from independent system development can be resolved through improved communication.

Communication has been described as the “glue that holds together” a supply chain (Mohr and Nevin, 1990). Communication among boundary-spanning personnel creates a shared interpretation of goals (Ring and Van de Ven, 1994), and may facilitate the creation of trust and a closer working relationship among the parties (Hutt and Stafford, 2000). We categorize communication as either formal or informal. Formal communications approaches focus on configurations resulting from formal authority relationships and formal mechanisms for the coordination of work (Johnson *et al.*, 1994). Formal communication includes agreed upon routines and schedules for

presenting and reviewing planning data, operating status and analysis of past performance – weekly reports or quarterly meetings of interested supply chain parties are easily understood examples. However, related to the previous technology integration point, much formal communication is facilitated by the interconnected computer systems of supply chain members. The continuous need to improve communications between supply chain members is the best rationale for investing in supply chain information systems (Mentzer, 2004).

Informal communication recognizes the social needs that underlie organizational communication and facilitates cohesiveness and autonomy of information flow outside of formal communication channels (Johnson *et al.*, 1994). Informal communication, often developed from the relationships created over time by supply chain boundary spanners, has been identified as a supporting factor of integration (Pagell, 2004). Ferdows *et al.* (2004) illustrate the effective use of informal communications at Spanish retail clothier Zara – what the authors refer to as closing the communications loop. The firm co-locates personnel from otherwise separate supply chain functions as a way of speeding up access to information; for example, clothing designers work next to procurement and production planning professionals. In another example, Zara retail store managers communicate with the headquarters group through PDAs that are used to transmit sales trends (formal) as well as subjective customer reactions to new styles (informal). Firms that establish formal and informal communications channels ensure that changing customer requirements are understood by members and enable quick reaction to performance and competitive issues. Thus, *RP2* follows:

RP2a. A firm that adopts a supply chain strategy will demonstrate a high level of formal communication across supply chain entities.

RP2b. A firm that adopts a supply chain strategy will demonstrate a high level of informal communication across supply chain entities.

Standardization of information is another element of structural integration. Standards are important in data coding as well as order notation terminology. Use of clearly understood terms shared by all members eliminates the need for firms to decode communications up and down the supply chain. Standardized data coding refers to other product, order, and customer information stored across the multiple firms' information systems. For example, firms must be consistent in defining what a "sale" means, i.e. is it a booked order, an invoiced order, a shipment, or a paid-for shipment? Such terms need to be common and clearly understood by each member of the supply chain. Standardization to a common set of values and definitions for each data code will save effort and reduce errors over the life of the partnership in most cases (Bowersox *et al.*, 1999). Likewise, standardized order notation enforces the use of common product/item numbers and order numbers to eliminate redundant effort of partner firms in maintaining database cross-references of "internal" part and order numbers. The internet has become a major cooperative enabler of supply chain standardization. Supply chain interorganizational information systems have evolved through four phases from the sharing of paper-based documents, EDI, ERP systems linked across multiple members and typically controlled by the supply chain leader, to the internet (Williamson *et al.*, 2004). The rapid growth of the internet has both reduced the cost and increased the flexibility available to supply chain member firms driving

toward an integrated set of standards (García-Dastugue and Lambert, 2003). Thus, *RP3* follows:

- RP3a.* A firm that adopts a supply chain strategy will demonstrate a high level of standardization of data coding communication across supply chain entities.
- RP3b.* A firm that adopts a supply chain strategy will demonstrate a high level of standardization of order notation communication across supply chain entities.

Decision-making authority also impacts integration (Chow *et al.*, 1995). Placing decision-making authority at the proper level in each firm has a positive impact on supply chain success. Centralized planning has been shown to lead to better overall control of activities, and greater operational flexibility in logistics firms (Droge and Germain, 1989; Stank and Traichal, 1998). Therefore, centralized planning and decision-making by a supply chain leader are hypothesized here as leading to better coordination, control, and consistency of supply chain activities. Alternatively, supply chain responsiveness may be improved by allowing problem-solving decisions to be handled locally. Implementation decisions are beneficial when on-site managers, possessing intimate knowledge of local information, are given decentralized decision-making authority (Nault, 1998). Individual supply chain members, therefore, possess the authority to make decisions and resolve certain issues without consulting other supply chain members. Rapid resolution of issues is a baseline requirement for smooth functioning of the supply chain (Droge and Germain, 1989; Mollenkopf *et al.*, 2000). Thus *RP4* follows:

- RP4a.* A firm that adopts a supply chain strategy will demonstrate a high level of centralized planning coordinated by a supply chain leader.
- RP4b.* A firm that adopts a supply chain strategy will demonstrate a high level of decentralized implementation decision-making.

Rewards and compensation, the final elements of supply chain structural integration, relate to the critical issue of motivating both employees and organizations to perform in a manner that benefits the total supply chain, sometimes at the price of sub-optimizing individual activity objectives (Bowersox *et al.*, 1999; Cooper and Ellram, 1993; Cooper *et al.*, 1997). Individual rewards and compensation should be created to incent boundary-spanning personnel to focus on improving process coordination and service. As with the informal relationship aspects described above, boundary spanners should be incented in a way that facilitates cooperation and collaboration with counterparts in other supply chain member firms. Specific functions must be viewed as contributing to the overall supply chain process as contrasted to stand-alone activities. This means that functional managers must be incented to guide operations toward the goal of lowering total supply chain costs and/or improving overall supply chain service, regardless of the impact on individual activity costs. Ultimately, rewards and compensation require a comprehensive understanding of all the variables that affect a supply chain's ability to deliver value to the customer.

Rewards and compensation also apply to the performance of upstream and downstream supply chain members. Rather than solely focusing on internal improvements that deliver savings to the individual firm, often at the expense of

suppliers or customers who are continually pressed to make improvements that seldom benefit them, firms applying a supply chain strategy are committed to sharing benefits from supply chain efficiencies. Sharing or mutually reinvesting supply chain gains motivates members to seek more ways to improve. Conversely, supply chain strategy involves risks that should be shared when appropriate. A policy of sharing mutual gain and risk reflects commitment to the belief that a firm's performance is closely linked to overall supply chain performance (Bowersox *et al.*, 1999). Thus, *RP5* follows:

RP5a. A firm that adopts a supply chain strategy will demonstrate a high degree of individual-level rewards supportive of supply chain goals.

RP5b. A firm that adopts a supply chain strategy will demonstrate a high degree of organizational-level rewards for up and downstream supply chain members in support of supply chain goals.

Supply chain performance considerations

SSP portrays performance as resulting from the fit of structure to the chosen strategy of the firm. Strategic determination is equated with establishing goals while performance is the evaluation of how well the goals are met (Chandler, 1962; Hofer and Schendel, 1978; Mentzer and Konrad, 1991). Atkinson *et al.* (1997) define three roles for performance measurement:

- (1) *coordination* that focuses decision-making on the most important objectives;
- (2) *monitoring*, or the actual measurement and reporting of performance; and
- (3) *diagnostic*, which is used to evaluate performance, identify improvements needed, and tie the non-financial metrics to financial measurement criteria and goals.

Goals established in strategy formulation are eventually translated into performance measures that are evaluated periodically, and ultimately drive adjustments to goals and strategies. Performance, therefore, is the measurable outcome of strategy execution and structural implementation. Thus, the shared goals identified in supply chain strategy formulation are used to derive performance measures for the supply chain entity. Failure to link performance to strategy may lead to the inability of the supply chain to achieve goals and meet customer expectations, and will not provide the vision necessary to influence individual goal-directed behaviors (Atkinson *et al.*, 1997; Brewer and Speh, 2000; Kaplan and Norton, 1992).

Mentzer and Konrad (1991) break traditional performance down into measures of efficiency and effectiveness, and state that both elements are necessary to accurately measure performance. Efficient performance measures how well the resources expended were utilized while effectiveness assesses the degree to which goals are accomplished. Traditional measures have been used to try to capture both the efficiency and effectiveness of supply chain strategy. Unfortunately, assessment of overall supply chain performance has been limited as the metrics employed have often been measures of internal supply chain operations as opposed to measures of SCM (Lambert and Pohlen, 2001). Traditional reporting systems have demonstrated three weaknesses with respect to capturing the efficiency and effectiveness of supply chain strategy, including:

- (1) important issues like customer satisfaction are ignored;
- (2) the basis in historical cost limits predictive ability; and
- (3) little or no ability exists to objectively judge effectiveness (Atkinson *et al.*, 1997).

The balanced scorecard method of performance reporting, based on the belief that performance is driven by the relationships developed with customers, the continuous improvement of processes, and innovative learning capabilities, provides one possible solution to these concerns (Kaplan and Norton, 1992). The balanced scorecard approach has four components:

- (1) Financial measures that provide the efficiency perspective are retained from the traditional performance reporting approach.
- (2) Customer perspective measures are developed to answer the question “how do customers see us?” Customer concerns may be classified along the four dimensions of time, quality, performance, and service.
- (3) Internal business perspective measures address the activities in which the firm must excel.
- (4) Innovation and learning perspective measures are more future-oriented and focus on the ability to create new sources of value for customers.

Brewer and Speh (2000) applied the balanced scorecard to the supply chain environment by linking the four measurement components outlined above to the primary goals of SCM. The format of the scorecard remains the same, however, the metrics used incorporate integrated and aligned measures across all firms. The specific measures used will vary by supply chain, but the four categories remain.

A primary difficulty with the balanced scorecard approach is that the metrics proposed in the scorecard apply to internal functions and have not been extended to multiple firms in a supply chain environment. The measures of efficiency and effectiveness must be integrated across the firms in the supply chain and take both a holistic, end-to-end view and a between firm, dyadic view to ensure the linkages at each step in the supply chain are actively monitored and tuned (Antia and Frazier, 2001; Brewer and Speh, 2000; Duarte and Davies, 2003; Holmberg, 2000; Lambert and Pohlen, 2001). Lambert and Pohlen (2001) have proposed an approach to supply chain performance measurement that assesses the economic value added (EVA) of combined supply chain effort to demonstrate that the benefits of SCM occur across the extended firms engaged in the supply chain. Specifically, the Lambert and Pohlen model demonstrates that when overall supply chain value is created each individual firm in the supply chain also benefits by improving shareholder value in one or more of four distinct areas including revenue enhancement, operating expense reduction, and working capital and fixed capital efficiency.

Overall revenue enhancement is accrued by improving the effectiveness of supply chain operations, for example, by ensuring availability of products and services that prove most important to the supply chain’s revenue and profit generation, as well as by creating proper information flows and metrics to incent supply chain firms to sell these products/services. Operating expense reduction is realized by streamlining processes,

reducing redundancy and duplication, and improving productivity and operating asset utilization. Such activity improves product flow efficiency and reduces the percent of revenue expended on supply chain operations. Working capital efficiency translates to inventory elimination. Improving flow-through and inventory turnover by enhancing forecast accuracy, streamlining flow processes, and speeding cycle times serves to reduce cycle inventory considerably and improve the supply chain's ability to respond to actual demand without huge investment in pipeline inventory. Fixed asset efficiency results indirectly from reductions in operating expense and working capital. Specifically, supply chain work performed more efficiently with operating assets and inventory utilized with higher productivity enable a firm to reduce facilities, equipment, and labor invested in achieving the same level of sales (Christopher and Ryals, 1999). Thus, *RP6* describes the relationship between supply chain strategy and structure and performance measurement.

RP6a. A firm that adopts a supply chain structure to support strategy will demonstrate a high level of revenue enhancement.

RP6b. A firm that adopts a supply chain structure to support strategy will demonstrate a high level of operating expense reduction.

RP6c. A firm that adopts a supply chain structure to support strategy will demonstrate a high level of working capital efficiency.

RP6d. A firm that adopts a supply chain structure to support strategy will demonstrate a high level of fixed capital efficiency.

Appropriate supply chain performance measurement should be used as a key input to future strategic planning (Bowersox *et al.*, 1999). Thus, the shared goals identified in strategy formulation are used to derive performance measures for the supply chain entity. Failure to link performance to strategy may lead to the inability of the supply chain to achieve goals and meet customer expectations, and will not provide the vision necessary to influence individual goal-directed behaviors (Atkinson *et al.*, 1997; Brewer and Speh, 2000; Kaplan and Norton, 1992). Supply chain member performance should be linked with the revenue stream associated with the supply chain. Failure to achieve required performance should lead to reduced compensation – without consequences, there is little incentive for member firms to improve performance. In the current environment, the supply chain leader firm is generally responsible for negotiating and enforcing such performance standards. Rather than reducing compensation, non-performing firms may be replaced, and thus lose the revenue stream entirely. Thus, *RP7* follows:

RP7. Appropriate supply chain performance will provide input to adjust supply chain strategy.

The major elements of supply chain strategy, structure and performance presented in the above narrative are presented in the form of layered boxes in Figure 2. This represents multiple firms working together in a supply chain. The concepts relate across all members of the supply chain, although the elements should be viewed from the perspective of a single, focal firm.

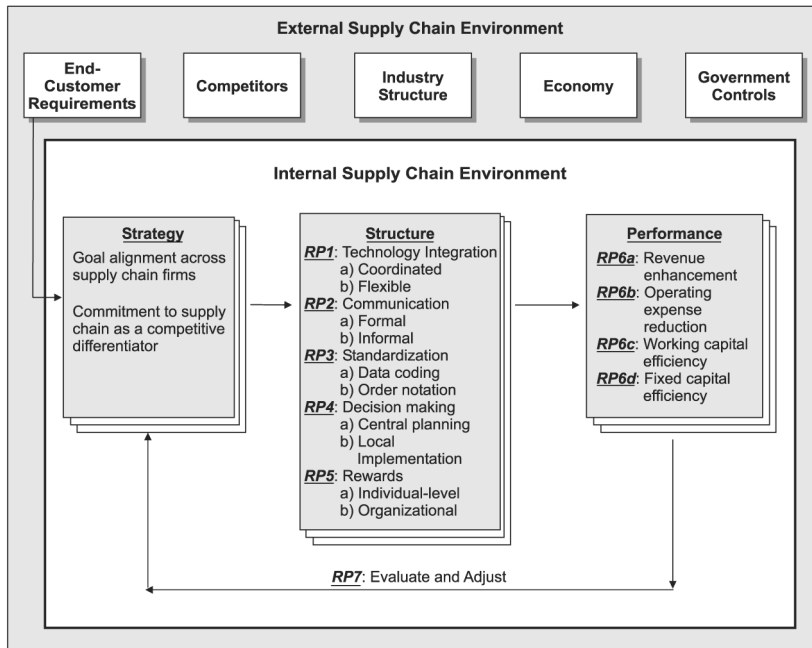


Figure 2.
SSP supply chain integration framework

Conclusion

Perspectives on SCM have evolved and changed rapidly in recent years and should continue to be directed toward viewing the supply chain as part of a dynamic system. This dynamic environment provides a fertile research ground for exploring the strategy formulation – performance monitoring – strategy adjustment decision loop suggested in Figure 2. Additional study of this phenomenon in dynamic scenarios may lead to normative conclusions that can guide managers faced with supply chain strategic change decisions as well as for academics seeking enhanced understanding of the phenomenon.

The framework shown in Figure 2 describes an iterative relationship between internal firm strategy, structure, and performance measurement systems. It implies that a company’s supply chain strategy should be complementary with that of supply chain partners. Disjointed strategies across the supply chain prevent firms from developing shared goals and utilizing supply chain capabilities as a competitive differentiator. Misaligned strategies were not discussed in detail, but it follows from previous literature that, for example, a firm intent on high quality delivery of customized products may not find the results it seeks by utilizing supply chain partners focused on a low cost strategy.

Figure 2 also identifies the elements comprising a supply chain structure required to support supply chain strategy implementation. The research propositions presented relate the nature of the relationship between pursuit of supply chain strategy and critical structural characteristics including technology integration, communication, standardization, decision-making location, and reward and compensation programs.

Specifically, it is proposed that supply chain strategy implementation requires investment in computer systems technology that supports coordination and flexibility among supply chain entities, creation of formal and informal modes of communication to facilitate the rapid sharing of information and business plans, standardization of information and processes, centralized planning decision-making supporting decentralized implementation of plans, and integrated individual and organizational reward structures that target overall supply chain goals. In addition, the framework proposes that EVA provides an effective tool for performance measurement through assessing the supply chain wide change in value associated with revenue, operating expense, working capital utilization and fixed capital efficiency.

Strategy research has consistently predicted structural outcomes in light of prior strategic decisions at the firm level of analysis (Chandler, 1962; Egelhoff, 1988; Lubatkin and Rogers, 1989; Rumelt, 1974). Supply chain research is a much younger field, and the research to date has been primarily descriptive rather than predictive – with strategy often equated with the degree of integration achieved across multiple supply chain entities. We present the argument that SSP theory has direct application in the supply chain environment and have presented five essential elements of structure associated with an effective supply chain strategy.

Three conclusions may be drawn from this review. First, SSP theory can be extended beyond the firm to the complex supply chain environment. SSP is a robust paradigm with over 40 years of exposure in the strategic management literature with the individual firm as the unit of analysis. However, a foundational element of supply chain research is that competition has migrated to the supply chain level of analysis (Christopher, 1992). Thus, it is now imperative that the most effective firm-specific theories be applied to the supply chain. We believe we have presented a compelling case for a new supply chain SSP theory. Second, although the tools may not be in place currently, supply chain structural and performance outcomes may be predictable. This is important because we believe effective supply chains require members to have either consistent or complementary supply chain strategies. Conflicting supply chain strategies existing across member firms will limit overall supply chain performance. An accurate predictive ability will give managers a tool to assist in making proactive adjustments to supply chain membership, policy and processes. Third, continuous performance monitoring is necessary to identify problems in early stages while they are more easily correctable. Further, member performance must be followed over time to identify situations where underperformance is due to member misalignment, possibly due to incompatible or recently changed supply chain strategy.

Implications for supply chain professionals

The primary implication of the framework for supply chain professionals can be summarized as “know your supply chain partners”. Are other members actually in line with your firm’s supply chain goals? Do their strategies mesh – either as consistent or complementary – to your own firm’s supply chain strategy? Strategic alignment is a necessary precursor to deployment of an effective multi-member supply chain structure. Therefore, supply chain professionals should ensure strategic alignment exists when considering bringing a new member into the supply chain. Ongoing strategic alignment can be checked through routine review of properly developed performance measures. Members that are not meeting performance goals should be

examined to confirm their strategies still support those of the overall supply chain. When this is the case, addressing the performance problem may require only a minor structural modification. However, in the extreme case, poor performance may point out members with incompatible strategies, and replacement may be required. In the case of end-customers, this indicates that suppliers must ensure that the strategies governing the supply chains used to deliver to each customer or customer segment must align with the strategic value sought by those customers. Segmentation into unique supply chains serving unique value requirements should follow.

Supply chains are constantly evolving and changing. This implies supply chain professionals should be looking beyond the current state of their supply chains. Competitive dynamics may call for strategic change, and this means supply chain strategies may need to change across multiple firms. Certain structural elements, such as formal communications processes across member firms may facilitate the understanding that change is needed and is coming. However, change may be difficult to accomplish on the required schedule. When this occurs the firm must have other options available to it. Obviously, one option would be to replace a slow changing member by internalizing the function. Many firms used to supporting a specific supply chain activity via a separate firm would not consider this a viable option. So, it becomes essential for the firm to maintain knowledge of other firms that could fit into their supply chains in the future. Periodic benchmarking of competitors' supply chains is one way to identify candidate members. Another approach is to seek input from other member firms in your own supply chain. Whatever the approach, the point is for firms to proactively identify candidate members before they are needed so supply chain performance is not compromised in a moment of crisis.

Implications for future research

The research described in this manuscript is an attempt at developing new theory in the supply chain discipline. As such, it remains untested. Each of the five structural elements should be examined in greater detail. The question for future research should not be whether these elements are associated with integration – almost without doubt they are all integrative techniques. The more interesting question is how are these elements manifested in a supply chain environment when members hold consistent supply chain strategies? Similarly, what form do these elements take when members have complementary strategies? Separately, is one or more of the elements present in an entirely different form when members have differing or inconsistent supply chain strategies? Supply chain leadership has not been covered in any detail in this research; however, leaders likely will use their influence to impose their will on less powerful members, or at least establish rules and standards members are expected to support.

The preceding questions concern only the five structural elements described here. Other common, or perhaps unique, structural elements may exist. Future research efforts may elaborate and inform academics of additional structural components that influence supply chain performance. A potentially fertile area for exploration is the world of boundary-spanning personnel so inherent to the supply chain phenomenon. Boundary spanners form bonds with counterparts in other member firms. The interpersonal relationships may drive the creation of unique structural elements not covered in this effort. For example, in a smoothly functioning supply chain the trust formed through repeated experience may lead to

elimination of formal communications structural elements that may be replaced by informal, or in the extreme essentially no communication, other than that associated with "management by exception".

To this point we have treated the supply chain entity as a consistently occurring, invariant concept. However, supply chains differ greatly in their makeup and functioning. Therefore, examining SSP outcomes across a variety of supply chain environments will be quite informative. An area that has received significant focus in the strategic literature is the environment of rapidly changing industries like those found in high technology (Eisenhardt and Martin, 2000; Teece *et al.*, 1997). Future supply chain research may follow this trend by investigating the incidence of member strategic alignment in supply chains supporting high-tech industries or products, compared to supply chains experiencing relatively less change.

We recommend that qualitative research be considered as an appropriate next phase of the research stream. Qualitative research is useful at gaining a deeper understanding of the phenomenon under study. We believe a rich description of strategic and structural elements is necessary to refine the propositions put forth in this manuscript. Later phases of inquiry may build on this foundation and grow the theory into the realm of prediction as described earlier.

Further research is needed across multiple industries to determine the overall applicability of SSP supply chain theory. Strategies and structural elements may differ greatly. The relative consistency or variation discovered in subsequent research will add to our knowledge. The SSP paradigm provides a theoretical basis for conducting this research, distinguishing the primary concept that strategy and structural elements should be aligned to foster organizational performance improvements. This paper serves as a blueprint for future research, identifying the key strategic and structural elements related to SCM that should be manipulated to achieve alignment and enhance performance. In particular, goal alignment across supply chain firms and commitment to the supply chain as a competitive differentiator are identified as critical strategic elements of SCM. Also highlighted are the importance of focusing on alignment of strategic elements with key structural elements of SCM including technology integration, communication, standardization, decision-making centralization and decentralization, and reward and compensation integration. Finally, we hypothesize that alignment between supply chain strategy and structure will enhance organization performance through revenue enhancement operating expense reduction, working capital efficiency, and fixed capital efficiency.

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