

# The collaborative supply chain

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### Abstract

**Purpose** – The purpose of this paper is to review the fundamental concept of collaborative supply chain (CSC) and discuss the facts that a road to success in the process of design, implementation and operations of a supply chain is the identification of superior strategies and clear objectives. One of these strategies is known as CSC, that needs to be studied, evaluated and implemented.

**Design/methodology/approach** – Discusses key elements of CSC and the fact that the vision for the CSC can be built upon principles as such as automation, information, trust and commitment, quality leadership, customer focused, collaborative and e-collaborative partnerships, and integrated information system.

**Findings** – The paper finds that to make supply chain management successful, management must be committed to high standard of performance, trust including long-term collaborative relationships that can deliver results independent of industry and sector type.

**Originality/value** – Owing to the fact that a better management of production system is related to the full understanding of the technologies implemented and the system under consideration, the CSC and its related components are discussed.

**Keywords** Supply chain management, Strategic objectives, Trust

**Paper type** Research paper

## 1. Introduction

La Londe (1998) has defined supply chain management (SCM) as:

[...] the delivery of enhanced customer and economic value through synchronized management of the flow of physical goods and associated information from sourcing through consumption.

Johnston (1995) has defined SCM as: “the process of strategically managing the movement and storage of materials, parts and finished inventory from suppliers, through the firm and to customers.” The various definitions that have been proposed by researchers signify that SCM stipulates organizational restructuring, extended to the achievement of a company-wide collaborative culture. SCM is a research area attracted the attention of many researchers for more than 20 years. It is concerned with cost effective way of managing materials, information and financial flows from the point of origin to the point of consumption to satisfy customer requirements (Narasimha Kamath and Roy, 2007). Collaboration is one of the most talked about topics in business today (Barratt, 2004; Bowersox *et al.*, 2003). In this regard, Anthony (2000) indicated that collaboration is defined as two or more companies sharing the responsibility of exchanging common planning, management, execution, and performance measurement information.

This paper recognizes two types of supply chains (SCs) namely:

- 1 typical SC; and
- 2 collaborative supply chain (CSC).

Typical SC is what also known as SC while CSC needs to be discussed in full details. Hence, the objectives of this paper are three fold:

- 1 to provide a brief review of SC strategies;
- 2 to develop a description of CSC with its key elements that can help organizations to add values to their business in a constructive manner; and
- 3 with regard to CSC review the performance measurement and metrics used in CSC.

The remainder of this paper is arranged in the following manner. Section 2 discusses SCM in brief. Section 3 is about the CSC. Main components of SC collaboration are discussed in Section 4. Collaboration and performance is topic of Section 5. Strategic collaboration is discussed in Section 6 and formalization is the topic of Section 7. Case examples of CSC, is the topic of Section 8. Managerial implication is discussed in Section 9. Discussion and conclusion is given in Section 10.

## 2. Supply chain management

Simchi-Levi *et al.* (2004) have defined SCM as a set of approaches used to efficiently integrate suppliers, manufacturers, warehouses, and stores so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time in order to minimize system wide costs while satisfying service-level requirements. SCM is widely used by companies to improve their ability level with the objective of being flexible and responsive to meet changing market requirements (Gunasekaran *et al.*, 2004).

In many cases, SC is a key for making profit while in other cases it is a tool for being presented in the market to generate business. Companies considered to be the best in the class for their SC performance must be able to operate their network

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efficiently at 4-7 percent of revenue less than the average company in their industry (Crum and Palmatier, 2004). Therefore, a company having an earning of \$300 million a year, this difference results in a \$12-21 million cost advantage every year.

SC is comprised of eight principle components as are discussed by Robinson and Malhotra (2005). Of the most valuable to this study are strategic management, practices, and performance components. Many researchers have discussed the topic of SC strategies (Gunasekaran, 1999; Min and Mentzer, 2004; Tan *et al.*, 2002). Some of the strategies used with SCM are:

- competitive strategy;
- product development strategy;
- marketing and sale strategy;
- SC strategy;
- strategic fit;
- global freight management strategy;
- customer focus strategy; and
- strategic sourcing.

### 3. Collaborative supply chain

SCM is the practice of coordinating the flow of goods, services, information and finances as they move from raw materials to parts supplier to manufacturer to wholesaler to retailer to consumer. This process includes order generation, order taking, information feedback and the efficient and timely delivery of goods and services (Aburto and Weber, 2007; [www.computerworld.com/softwaretopics/erp](http://www.computerworld.com/softwaretopics/erp)). A collaborative SC involves "two or more independent companies (that) work jointly to plan and execute supply chain operations with greater success than when acting in isolation" (Simatupang and Sridharan, 2002, p. 19).

Retail trades and vehicle manufacturing industries are the main recipients of the SCM and collaboration. The manufacturing industry has been the pioneer in developing SCM for many years (Landry, 1998). Owing to the fact that in agriculture environment decision making, as a result of dynamic consumer demand, global competition and the dismantling of social protection (Boehlje, 1996), has played a big role therefore SCM relationships are becoming more important. Retailing industry has been very successful in implementing SCM strategies mainly because of powerful competition, high-volume low-value product lines with marginal cost savings benefiting price conscious customers and the competitive standing of their suppliers (Hollis, 1996).

In this research, an attempt is made to examine the collaboration within a SC context. The basic idea behind the collaboration is that it is not possible for a company to compete in this competitive market successfully by itself. And, that is because, customers are more demanding, and competitions is escalating (Kotler, 1997). As a general philosophy, collaboration has been studied for different domains. In this regard, Powell *et al.* (2005) have conducted a study in sociology while Stern and Hicks (2000) and Konczak (2001) have conducted studies in psychology. Gadde *et al.* (2003), Jap (1999) and Perks (2000) carried out studies in marketing. In management, Cross *et al.* (2002), Sawhney (2002) and Singh and Mitchell (2005) have done some valuable works in collaborative matters. Collaborative commerce, the way companies interact with each other, has also been studied extensively. Collaborative commerce enables

companies to improve the way they manage their cross-enterprise value chains dramatically (Chen *et al.*, 2007). The key to value creation using collaboration has been studied by Horvath (2001). Studies on collaboration in SCM were conducted very recently by Holweg *et al.* (2005), Tuominen (2004) and Daugherty *et al.* (2006).

Taking high risks more often is not always advantageous even if it may have big rewards to come through. To reduce risk and share rewards some firms get into the inter-firm collaborative arrangements in order to share risks and rewards. One well-established form of that is the reinsurance concept in insurance industry where risks and rewards are shared based upon the amounts at risk shared by the partners. This is because organizations like to manage their objective of securing higher performance which could not be possible and achievable if they had operated their business individually.

A great deal of the works published on the subject of SC collaboration and collaborative relationships focuses on formation/set-up of the arrangements, roles and responsibilities, and guidelines for their operation (Manrodt and Fitzgerald, 2001). There has also been a focus on case histories of specific collaborative ventures (Batenburg and Rutten, 2003; Ellram and Edis, 1996; Esper and Williams, 2003; Lambe *et al.*, 2002).

SC collaboration puts firms in a position of achieving better performance. To reach there, all participating members should make all necessary arrangements of collaborative practices, play according to rules, struggle to achieve the leading SCs benchmarks, and follow all ethical principles to make things work well. Benchmarking enables them to identify the highest standards of excellence in customer services and processes and implement necessary improvements to match or exceed these standards (Simatupang and Sridharan, 2004). Considering an achieving level of standard for a company it will put them in a position to work hard and make all necessary improvements to get there. Collaboration has been referred to as the driving force behind effective SCM and may be the ultimate core capability (Min *et al.*, 2005).

To ensure optimum performance, companies must work to reduce costs, accelerate operation, and improve quality both in their own processes and in their partner organizations. By gaining cross-company visibility and control, companies can identify and pursue opportunities for SC improvements. Both buyers and suppliers can benefit by collaborating on critical SC issues. That is from initial ordering all the way through shipping, inventory, and overall management. The i2 collaborative supply execution allows companies to manage their supplier interactions in the same system.

The i2 collaborative supply execution capabilities can be summarized as follows:

- closed-loop planning and execution by forcing rapid re-planning capabilities in advanced planning systems;
- ease of customization and creation of workflows through a visual design studio;
- flexibility and extensibility to re-configure business processes;
- multiple processes and replenishment modes to support multiple replenishment or supply strategies in the same system; and
- ease of integration with internal and external systems.

Quality control measures such as TQM, ISO 9000, and six sigma can help companies set and achieve standards of

excellence in their production processes. Companies implementing such programs successfully are applying them throughout the company to improve quality and reduce waste. As a result, many organizations are reducing costs, increasing profits and/or revenues, and meeting customer expectations. Caterpillar organization considers its six-sigma process to be its number one critical success factor – and it is easy to see why. In one year, six sigma returned \$40m to the company's bottom line – a substantial return on investment (Dyer and Nobeoka, 2000).

Benefits of i2 collaborative supply execution can be listed as follows:

- lower total cost of ownership;
- reduced response time to demand changes;
- reduced inventory (raw, work-in-process, and finished goods);
- reduced logistics expenses;
- increased visibility into supply, demand, and inventory, as well as status of orders and shipments; and
- increased ability to coordinate with multiple tiers of trading partners.

#### 4. Main components of collaboration

The management of SC is, in fact, to generate a link between planning and control of supply process and corporate competitiveness. In this regard, management proposes the economic gain achievement by the expert use of SC resources. In the collaboration domain, four things that play high are:

- 1 integration;
- 2 automation;
- 3 information; and
- 4 trust.

##### 4.1 Collaboration and integration

The fundamental rationale behind collaboration is that a single company cannot successfully compete by itself. Customers are more demanding; competition is escalating (Kotler, 1997). Thus, many firms seek to coordinate cross-firm activities and work reciprocally over time to produce superior performance (Anderson and Narus, 1990; Stern and Reeve, 1980). What is known as an integrated SC is a chain of organizations, resources, and activities that are involved in the designing stage, manufacturing process, shipping phases and delivery points of values in the form of final products and services to end customers. In the application of SCM, internal and external materials decisions become part of a focused sourcing strategy aimed at winning customers and increasing competitiveness. Integration ensures that all transactions interface seamlessly with existing internal and external applications.

##### 4.2 Collaboration and automation

“Supply chain automation and collaboration” has gained the attention of researchers in recent years. Collaboration by sharing information has joined the ranks of integration and automation as a hallmark of competitive advantage in the SCs. The information to be shared is about inventory, sales, demand forecast, order status, product planning, logistics, price, and production scheduling. Such information can be classified into three classes as:

- 1 product information;
- 2 customer demand and transaction information; and
- 3 inventory information.

#### 4.3 Collaboration and information

Information technology (IT) plays a significant role at every stage of the SC by enabling companies to gather and analyze information. IT systems have different levels of functionality that can capture and display information, analyze it to solve short- or long-term problems. An organization can use IT systems for making appropriate decisions on strategic, planning or operational problems within a SC. Feldmann and Müller (2003) has proposed an incentive scheme for true information providing in SCs. Successful collaboration requires a change from standard business practice, particularly relating to information exchange (Stank *et al.*, 2001). Free exchange of data, operating plans, and financial information is needed to gain the full benefits of collaboration (Quinn, 1999). In relation to information sharing, the challenge is:

You need to use information in the SC to change the decision-making process and to get people involved on a proactive basis in order to capitalize on opportunities – not just prevent problems (Verespej, 2005).

#### 4.4 Collaboration and trust

A trust-based relationship between two stages of a SC includes the dependability of two stages and the ability of each stage to increase faith. When a good relationship exists the transaction cost between SC stages can be reduced. Currall and Inkpen (2002) indicated that trust is the decision to rely on a partner with the expectation that the partner will act according to a common agreement. Cooperation and trust within the SC help to improve performance. Although cooperation and trust in a SC are valuable for the management purposes but, related quantities are hard to get hands on and sustain. For various reasons, firms take this step and add another dimension to the many that already exists as such as uncertainly and risk, in their complicated decision-making process. This is mainly because they want to gain access to the social and economic benefits that come along with these relationships. Currall and Inkpen (2002) pointed that at any level of trust, a certain amount of relational risk is presented as a partner may not act according to the agreement. The SC system is very much dependable upon the high level of trust. When trust is high and managers can depend on each others' information then decisions can be made easier and faster and hence, products, services, ideas, and information can flow freely to help design, implement, and manage initiatives that create added values. When trust is low, an alliance can still exist (Das and Teng, 1998, 2002), but that alliance's effectiveness will likely be hindered (Kwon and Suh, 2004; Lewicki *et al.*, 1998). More works on trust and SC are conducted by Fawcett *et al.* (2004) and Handfield and Bechtel (2002) as well.

There are two classes of taught on how cooperation and trust can be built into the SC relationship, as listed as follows:

- 1 prevention-based view; and
- 2 process-based view.

In the first case, the parties have to use variety of formal contracts to ensure cooperation while in the second case the trust and cooperation are built over time. To design an effective SC partnership one needs to take following steps into consideration:

- 1 the assessment of relationship value;
- 2 the operational roles identification and decision rights for each party;

- 3 developing effective contracts; and
- 4 designing effective conflict resolution mechanisms.

Managers should focus on important factors when managing SC relationships. The factors to be concentrated on are:

- flexibility, trust and commitment;
- good organizational arrangements regarding information sharing;
- swift conflict resolution; and
- acting fare as a stronger partner.

With trust may come something called the “shortcoming and deficiency in trust” which is also known as “defection”. In SC, this may occur in three ways as researchers have recognized:

- 1 free riding (Dyer and Nobeoka, 2000);
- 2 hold-ups (Gilbert and Cvsa, 2003); and
- 3 leakages (Zhang, 2002).

Olson (1965) indicates that “Free riding” will occur when an alliance partner try to gain the benefits of the alliance without contributing to their creation. “Hold up” occurs when a partner attempts to claim an unfair share of the value that is created (Gilbert and Cvsa, 2003). The “leakage problem” occurs when an alliance partner attempts to use the resources of the alliance to create value outside of the alliance (Zhang, 2002; Olson, 1965). The very most important think about the trust is that “it is not going to happen immediately” (Daugherty *et al.*, 2006). Sufficient time will be needed to develop partnership trust and each partner is responsible in doing so on a daily basis. Partners will trust each other once that trust is earned.

## 5. Collaboration and performance

A number of researchers have studied SC performance (Brewer and Speh, 2000; Forker *et al.*, 1997; Gunasekaran *et al.*, 2001, 2004; Johnson and Davis, 1998; Lapide, 2000; Lin *et al.*, 2002; Yamin *et al.*, 1999; van Hoek, 1998). Brewer and Speh (2000) proposed the use of balance scorecard for measuring SC performance. Gunasekaran *et al.* (2001) have a list of key SCM performance metrics that are broken into strategic, tactical, and operational levels. Besides, that each of these cases are divided into financial and non-financial situations (Gunasekaran *et al.*, 2001).

In a study conducted by Daugherty *et al.* (2006), a panel’s members were asked to indicate the levels of the success that their companies have experienced from the collaborative relationships. Seven common business metrics of information visibility, service levels, end customer satisfaction, flexibility in doing business, cycle time, business volume, and inventory visibility were selected for examination. In this study, a seven-point scale of Likert was used where 1 means “not at all successful” and 7 means “highly successful” and 4 was considered as “neutral”. The scale items used in the performance metrics by Daugherty *et al.* (2006, Table 2) are:

- improved information visibility;
- improved service levels;
- improved end-customer satisfaction;
- increased flexibility in doing business;
- reduced cycle time;
- increased business volume; and
- improved inventory visibility.

Leadership must fully understand SCM and the value that it can bring to the firm’s bottom line. This is a very critical issue for the success of the company but it is ignored from time to time. Wal-Mart and Dell are good examples of the synergy between SCM and corporate strategy. These highly functional and operational firms see successful management of their SC at their competitive advantages. Michael Dell drives SCM excellence throughout the company while at Wal-Mart, senior executives and managers at all levels reinforce SC excellence. On the other hand, store managers understand that the key to the success of Wal-Mart lies in daily deliveries keeping products always available for customers to buy and letting promise of “always low prices” to work along.

SCM leaders do not necessarily have to be the cheerleaders. Their vision for the SCM must speak to each member of the organization and be able to set standards. Having the right vision set for the organization then the efficiency of SC must be taken into consideration. The Global Supply Chain Forum identified eight key processes that drive SC efficiencies:

- 1 customer relationship management (CRM);
- 2 customer service management;
- 3 demand management;
- 4 order fulfillment;
- 5 manufacturing flow management;
- 6 supplier relationship management;
- 7 product development and commercialization; and
- 8 returns management (Stock and Lambert, 2001).

Another key to the success of any organization is paying attention to the CRM in order to reduce costs and increase profitability by solidifying customer loyalty. Each customer has different needs and expectations and must be properly managed by organization’s CRM strategy. Software packages are available to help firms to collect data from their customers and then analyze the data to manage key relationships.

The entire vision of SC can be focused on providing superior products and process quality. This means that business partners must be chosen correctly who can be trusted on providing products with high level of quality. One way to do so is making partnership with well-known names or blue chips companies. Customer focus must be a part of the company’s vision with this knowledge that the SC must be driven by demand. This is a type of the Pull/Push SC. Dell.com, a successful US computer company, based in Dallas Texas, is a typical push/pull SC. In this SC, customer order and manufacturing cycle is part of the pull processes while procurement cycle is part of the push processes. Dell carries only about ten day’s worth of inventory. In contrast, the competition, selling through retailers, has been carrying about 80-100 days.

The SC vision can be built on the following principles:

- quality leadership;
- customer focused;
- driven by demand;
- collaborative partnerships;
- design for SC;
- integrated information system; and
- strategic partnership and trust.

Concerning the expected outcomes of SC collaboration, the literature suggests the benefits shown in Table I.

**Table I** Expected outcome of SC collaboration

Topics	Researches
<i>SC capabilities</i>	
Demand planning	McCarthy and Golicic (2002)
Inventory visibility	Sabath and Fontanella (2002) and Stank <i>et al.</i> (1999, 2001)
New knowledge and skill	Verespej (2005)
<i>SC efficiency</i>	
Reduce inventory and cost savings	Sabath and Fontanella (2002) and Stank <i>et al.</i> (1999)
<i>SC effectiveness</i>	
Improve customer responsiveness	Sabath and Fontanella (2002)
Better access to target market segments	McCarthy and Golicic (2002)

## 6. Strategic collaboration

One thing important about the collaboration is the consideration of strategic aspect of that. A number of researchers have written about collaboration and how to set up collaborative arrangement (Aviv, 2001; Barratt, 2003; Bowman, 2004; Crum and Palmatier, 2004; Forger, 2001; Hyland, 2002; Olalle and Marquez, 2003) but less attention was given to the strategic aspects of situation. This will make collaborative efforts not lasting long enough but fail sooner rather than later. Care should be taken in selecting right collaborative partners, matching inter-organizational needs and capabilities, and clearly defining standards, metrics, goals, and implementation procedures over a pre determined planning horizon of one to five years. Ford (1980) has elaborated on the benefits of collaboration, rather than adversarial, working relationships within and beyond the organization. Lummus *et al.* (1998) observations point to this fact that SCM was growing because of the:

- severe market competition; and
- the acceptance of organizational change and its impacts on company fortunes.

## 7. Formalization

Formalization deals with how the structured things are (in this instance, the formal structuring of SC relationships (Daugherty *et al.*, 2006). High formalization means that decisions and working relationships are influenced, for an extended period of time, by formal rules and by standardized policies and operating procedures. Formalization of strategic collaboration sets expectations of what should be done and establishes standard practices (Daugherty *et al.*, 2006). For example, a highly formalized relationship may detail the extent of information sharing, identify the type of information that is shared, establish a framework for joint planning, implementation, and control, and defining the contractual terms of the relationship (Daugherty *et al.*, 2006). The scale items used in the level of formalization (adapted from Table 1 of Daugherty *et al.*, 2006) are:

- communication between our company and trading partner takes place frequently;
- the basic terms of our relationship have been explicitly verbalized and discussed;

- the terms for sharing information between our companies have been explicitly verbalized and discussed;
- we share proprietary information with each other;
- we include each other in formal business planning meetings;
- our expectations of the trading partner are communicated in detail;
- we always share supply and demand forecasts;
- we both share relevant cost information; and
- contact between our company and the trading partner is usually on a formal and preplanned basis.

As a result of the study conducted by Daugherty *et al.* (2006) it is shown that formalization is necessary for successful collaboration execution. Formalization is defined as the extent to which decision making is regulated by explicit rules and procedures (Dwyer and Oh, 1987). Approximately, one-third of the respondents (20 of the 55 that returned the surveys) considered formalization as an essential part of the collaboration process. The areas of formalization suggested by the respondents are (Min *et al.*, 2005):

- co-developing performance metrics – key performance index, scorecard, product/service deliverables – and the resulting incentive;
- prior agreements on collaboration goals or objectives;
- determining roles and responsibilities of each partner as well as reporting mechanisms in the relationship;
- laying out collaborative implementation plans;
- standardizing IT;
- specifying information to be shared; and
- aligning collaboration schedules.

## 8. Case examples of CSC

In this section, some reported case experiences in the literature are reviewed with the objective of finding the role of collaboration in better modeling and management of SC systems. The cases to be taken on in this study are:

- 1 an empirical study resulted to a conceptual model of SC Min *et al.* (2005);
- 2 processing systems interacting with other systems for better production performance (Türkay *et al.*, 2004);
- 3 a collaborative production-distribution planning problem in SC systems Selim *et al.* (2008); and
- 4 strategic supply and the management of inter-and intra-organizational relationships (Cousinsa and Spekmanb, 2003).

### 8.1 Case 1

In a study conducted by Min *et al.* (2005), SC executives were gathered to providing insights on the concept of collaboration. Researchers have used the survey data, personal interviews, and a review of the collaboration literature for developing a conceptual model profiling behavior, culture, and relational interactions associated with successful collaboration (Min *et al.*, 2005). In this gathering, respondents were able to report many cases where collaboration was financially rewarding for their companies. As reported, one retailer was able to reduce thermo-packaging-related costs by 12 percent while their vendor partner boosted profit by 8 percent as a result of adjusting sourcing scheduling. Another retailer has talked about his company's decision to allocate more sales promotion dollars to their collaborative trading partner. The decision resulted in significantly increased transaction

volume between the two collaboration partners (Min *et al.*, 2005).

Figure 1 shows a conceptual model of SC collaboration that was developed based upon the empirical data. This conceptual model is comprised of three portions of:

- 1 antecedents;
- 2 collaboration; and
- 3 consequences.

The collaboration portion of the model is composed of information sharing, joint planning, joint problem solving, joint performance measurement, and leveraging resources and skills. There exists a flow from collaboration to consequences and also from consequences back to the collaboration. In this model, consequences include efficiency, effectiveness, profitability, reinforcement and expansion of the relationship while antecedents are strategic intent, internal alignments, relationship orientation, relationship-specific investment, free flow of information and heightened, and formalization (Min *et al.*, 2005).

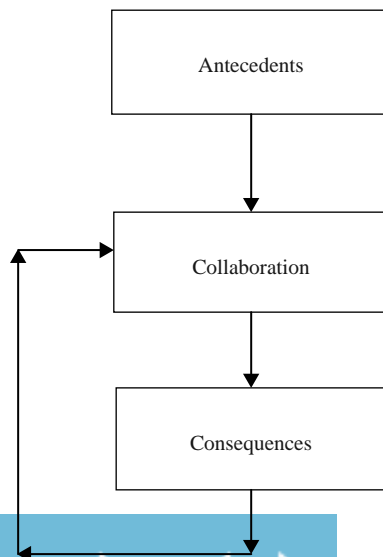
### 8.2 Case 2

Process systems must interact with other systems for a better production performance. The interaction among process systems is usually established when these systems exchange materials such as steam and electricity. Türkay *et al.* (2004) have developed a mathematical programming model of the SC situation that uses three steps of:

- 1 the generation of standardized models for process units;
- 2 integration of process unit models for the SC system; and
- 3 solution of the model and analysis of the results.

In this research, the objective was set to develop a quantitative assessment to the question of: "Does the multi-organization collaborative SCM create a synergy to overcome financial and environmental obstacles and difficulties for survival and growth?" Integrated analysis of different process systems can provide valuable insight and identify improvements in the financial and environmental performance of industrial SC systems (Türkay *et al.*, 2004). Going along with this idea, an example problem is illustrated considering two energy systems

**Figure 1** A conceptual model for SC collaboration



each having two fuel tanks with different fuels, two boilers and two turbines. The energy systems must fulfill the electricity and steam requirement of the processes they serve. The objective function is defined as the minimization of the cost:

$$\min Z = \sum_i \sum_j \sum_k C_{ijk} + \sum_i \sum_j \sum_{i'} \sum_{j'} (CEL_B - CEL_S) x e_{ij'j'}$$

The first term of the objective function gives the total cost of fuel used in the boilers. The second term includes the exchange of material between the unit  $j$  of company  $i$  and the unit  $j'$  of company  $i'$ .

For comparison purposes and to assess the synergy generated by integration of companies 1 and 2 through exchange of material (integrated), researchers have solved the same problem to optimality after eliminating the exchange of material between these companies (non-integrated situation) (Türkay *et al.*, 2004) (Figure 2). When the results of the integrated solution are compared with the results of the non-integrated solution, on the basis of total cost and the SOX released, it was observed that in both cases the integrated situation has worked better, as shown in Table II.

### 8.3 Case 3

Selim *et al.* (2008) have developed a collaborative production-distribution planning problem in SC environment using a multi-objective linear programming model. In order to reflect the collaborative planning issues into the model of the problem and to provide a more realistic model structure, decision makers' imprecise aspiration levels for the goals are incorporated into the model using fuzzy goal programming (FGP) approach (Selim *et al.*, 2008). To explore the viability of different FGP approaches for the collaborative production-distribution problem in different SC structures, computational experiments are performed on a hypothetically constructed case problem. Computational results support the researcher's assertion that FGP approaches can effectively be used for handling the collaborative production-distribution planning problems in different SC structures.

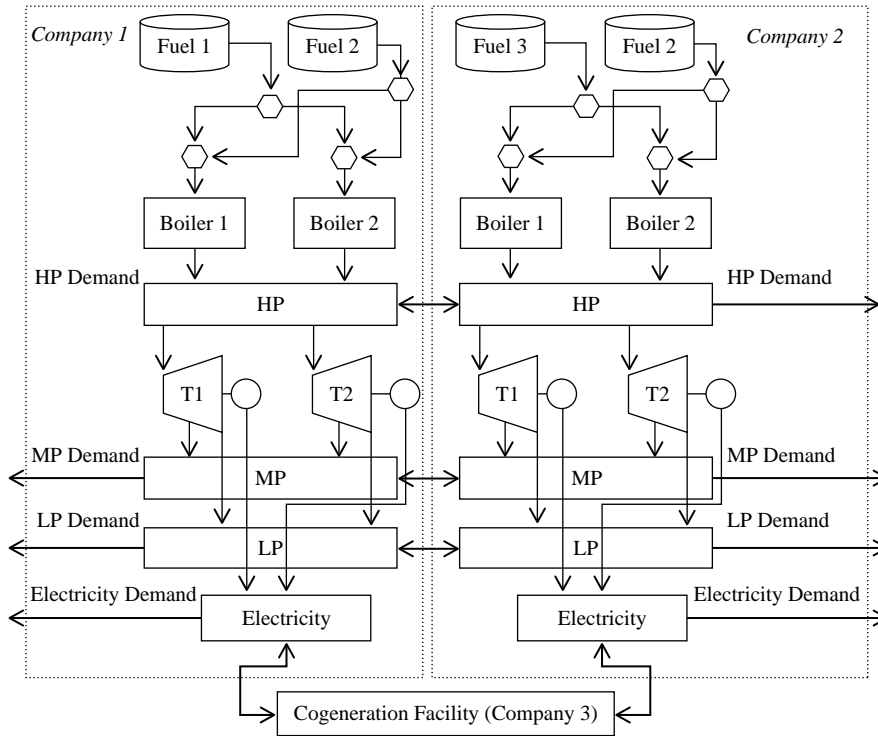
### 8.4 Case 4

Cousinsa and Spekmanb (2003) have conducted a research on the strategic supply and the management of inter and intra-organizational relationships. It is important for management to understand the elements of SCM better by studying what firms' attitudes are toward the strategic supply and relationship management. Strategic supplies symbolizes the importance of enterprise wide thinking where functional units inside the firm and key suppliers from the firm's SC all work in concert to bring value to the marketplace (Cousinsa and Spekmanb, 2003) (Figure 3). Researchers have used data from the USA and the UK to help them understand better and address issues that are keys to managing across independent SC partners.

A 12-month research project has been launched to investigate the level of strategic maturity of US/European companies and to estimate the level of collaboration that leading UK companies had with their major customers. This research was based on the following hypotheses:

- H1. Long-term collaborative relationships deliver sustainable competitive benefits for both the customer and supplier.

Figure 2 Flow-sheet of the illustrative example



Source: Türkay et al. (2004)

Table II Comparison of the results

	Non-integrated	Integrated	Change (%)
Total cost	16,051	15,690	2.25
Sox release	375.84	349.23	7.1

Source: Türkay et al. (2004)

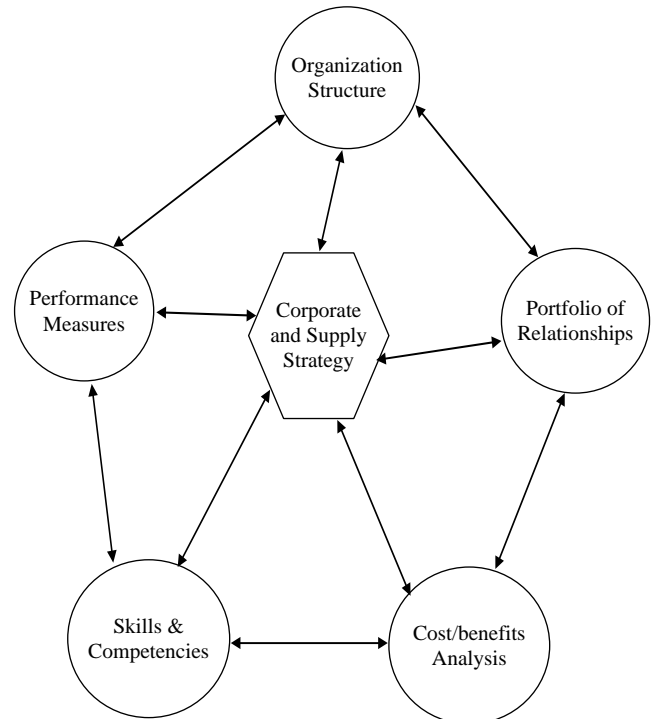
- H2. Collaborative relationships require a more integrated way of working and thus a more sophisticated skill set.
- H3. Collaborative relationships deliver results independent of industry and sector type.
- H4. Either the customer or supplier can initiate collaborative relationships.

### 9. Managerial implications

Collaboration is about integration within and outside the boundaries of individual firms, which makes collaborative efforts hard to accomplish (Min et al., 2005). The key managerial implications emerged from this research are:

- Collaborative SC is a necessity for the business but not a luxury.
- All managers and working groups talk about the collaboration and how important it is for the SC, but not many of them really know what that is about.
- Many believe that customers are the real beneficiary in this game.
- How good the collaboration really can be? The response is that it depends upon the partners of SC and the fact that how good they want their collaborative system to be.

Figure 3 Strategic supply wheel



Source: Cousinsa and Stekmanb (2003)

- From one industry to another, the degree of collaboration differs. As it is reported, food industry has developed good CSC.

- Formalization is a critical key to fostering strategic collaborative relationships (Daugherty *et al.*, 2006).
- Collaboration goals often center on SC efficiency (figuring out better ways to do things) and better inventory control. Examples of good progress were noted including increased business volume, inventory reductions, decreased lead time, and higher service levels (Min *et al.*, 2005).

## 10. Discussion and conclusion

Companies have used SC collaboration to gain competitive advantages. This concept has been exercised in every domain of business as well as retail, automobile, and agriculture. The philosophy is not something new but its applications in some complex domain of business as such as SC is highly interesting and rewarding. Although, every partners would be the beneficiary but the feeling is that main beneficiaries of CSC are customers. This is because collaborations are tailored toward them and, most of the times they initiate the efforts and design the arrangement. Collaboration gets as good as the partners wants it get and that is because there is no formula for making it happen. It clearly depends upon the efforts of all partners and any penetration in its fragile wall can make it collapse. In this paper, author has discussed about the CSC, CSC and automation, CSC and information, CSC and trust, CSC and performance, strategic collaboration, and formalization. Four cases from the literature are reviewed to demonstrate the practicality of collaboration in SC and the benefits that it might bring by itself for the partners.

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