2

Current Supply Chains Management Issues

2.1 Current Issues in SCM

The concept “supply chain management“ (SCM) is used in this book to refer to the means by which firms engage in creating, distributing and selling products [1]. That includes all cooperative efforts among members of the Supply Chain (SC) in order to reach higher market intelligence through a more precise market information gathering, product research, product development and design, and value analysis of the total system [2–4].

The term supply network will also appear in this text given the nature of the supply relationships at present, that is, non-linear flows, network-like systems and webs of suppliers and customers. Supply networks, as we will see, may become an extremely powerful competitive advantage for industrial organisations;

Notice that the presence of these supply networks becomes almost compulsory in cases where businesses have to deliver more value in new ways; to be faster to market, to become more flexible in responding to demand changes and to lower costs. In order to provide these higher service levels many companies have turned to external suppliers to provide them with capabilities that they themselves could no longer provide. Clearly, in such cases, real competition is no longer company vs company but SC vs SC.

With this in mind, what are the supply network capabilities needed for success in the marketplace? How do we integrate capabilities through contracts portfolios, unique products and/or services or relationships? These are the key strategic SC issues that will be addressed in this book.

2.2 SCM Issues and Related Problems

A vast list of SCM issues and related issues and problems can be found in the literature. Chandra and Grabis [5] summarise these issues and problems as shown in Table 2.1. They state that from this table it can be gleaned that SCM issues pose complex problems and that the SCM problem domain can be
analysed at various levels of decomposition. On the first level, the overall problems of SCM consist of multiple sub-problems such as product design, network design, logistics management, customer service and others. Chandra and Grabis also define these problems as general and specific. Specific problems occur at the vertical direction of problem decomposition and deal with one particular issue, for instance, inventory management. General problems cross multiple specific problems horizontally. Dealing with problems requires solving multiple specific problems, for instance, ensuring customer service involves solving problems from logistics and sales areas.

Table 2.1. SCM issues, related problems and suggested problem-solving approaches [5]

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<th>Supply chain issue and related problem</th>
<th>Problem-solving Approach</th>
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<td>Distribution network configuration</td>
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It is clear that SCM involves dealing with multiple managerial and technical problems [4,6] highlighting several common issues that must be addressed for a supply chain to function effectively and efficiently.

2.3 Network Configuration and Competition

In a very interesting work Rice and Hoppe [7] studied, using the Delphi method, how supply chains may compete against each other. They considered and analysed three scenarios, since no single scenario provides a universally valid Characterisation of competition:

1. Competing as SC vs SC literally. Competition among groups of companies across the supply network competing as one entity, formally or informally. This competition applies when the following conditions
are present (notice that these conditions may apply only to one of the competitors):

- SC is a vertically integrated company, either competing against another similar vertically integrated company or against supply networks comprised of many companies;
- when the supply network is a highly integrated company with no common suppliers;
- when the supply network is comprised of companies that have sole-source relationships;
- when the industry is fragmented in such a way that there are no common strategic suppliers represented in more than one supply network, and most strategic suppliers are dedicated to one supply network.

2. Competing on supply network capabilities. Competition between individual companies competing on their internal supply network capabilities. Mainly competing on the effectiveness, efficiency and responsiveness of the network and on the network design used (for instance, applying innovative postponement production strategies, introducing new distribution channels, etc.). Network capabilities can be added or integrated (not copied).

3. Competing on supply network capabilities lead by a Channel Master. Competition centred on the single, most powerful company of a supply network (referred many times as the channel master). This scenario is commonplace in today’s marketplace.

These three scenarios are considered not mutually exclusive; Rice and Hoppe presented cases of vertically integrated companies (ZARA) competing against Channel masters (The Limited) and against other parts of interconnected supply networks competing based on their network capabilities (The GAP).

In Figure 2.1 completely disconnected supply networks compete against each other with no overlaps at any tier (for example, automobile manufacturing supply chains of the US, Germany and Japan in the 1970s).

Figure 2.1. Completely disconnected supply networks (adapted from [7])
In Figure 2.2 each of the three networks overlaps with each other. Each company at every tier sells good to every tier \((n+1)\) company.

**Figure 2.2.** Completely overlapped supply networks (adapted from [7])

Competition in the hi-tech industry is, as in many other industries, somewhere between these two extremes (Figure 2.3) with some overlaps and some completely disconnected tiers within the networks.

Overlaps are common for commodity products procured efficiently from multiple members in the open market. For instance Dell and HP (and Compaq before the merge with HP) compete in modular product architecture and they have a fragmented supplier base creating significant overlap.

Also, as mentioned by Rice and Hoppe, in most cases many of the potential links are eliminated because there are closer relationships with some companies, depending on the nature of the product, price and capacity of the supply network (for instance, two hi-tech supply chains may overlap limited to memory, software and/or engine).

But once capabilities to be improved or developed are determined, we have to plan actions and tactics to put them to work. At this moment we have to understand that creating network strengths while meeting customer needs is not an easy job. This in fact requires higher and deeper levels of coordination among the companies in order to ensure that they create unique value. In the following paragraphs issues related to this phase will be reviewed.

**Figure 2.3.** Partially overlapped supply networks (adapted from [7])
2.4 Sharing Information Through ICTs

An important aspect to improve coordination among network companies is the evolution of the role played by information and communication technologies (ICTs). Researchers agree that sharing critical information, in context, in time, has been shown to reduce inventory dramatically and improves the performance at all SC levels (see Figure 2.4).

Shore [8] separates this evolution of ICTs in supply chain management into four stages:

- in the first stage, inter-organisational information exchanges travelled through the postal system or fax;
- using EDI, the second stage focused on the automation of information flows and the elimination of many labour intensive data entry and re-entry processes between retailers and suppliers;
- the third stage emphasises a more integrative strategy by implementing ERP systems;
- in the fourth stage, a supply chain is characterised by strategic supplier alliances with extensive two-way information flows.

![Figure 2.4. Information sharing in the supply chain](image-url)

Collaboration by sharing information has joined the ranks of integration and automation as a hallmark of competitive advantage in the supply chains. C-commerce has been described [9] as achieving “...dynamic collaboration among employees, business partners and customers throughout a trading community or market....” The ability for businesses to “morph” into whatever the market needs
them to be, in time, all the time, clearly means more than buy–sell transactions and auction events.

The benefits of c-commerce are similar to those achieved in the 1980s through concurrent engineering – reduced time to market, increased market share, and faster response to changes in custom preferences. The big difference between c-commerce and in-house concurrent engineering is that c-commerce requires integrated processes, pervasive information sharing, cooperation, and trust across firms.

The possibilities for information sharing include inventory, sales, demand forecast, order status, product planning, logistics, production schedule, etc., and can be summarised as three types: product information, customer demand and transaction information, and inventory information. Each of these topics will be reviewed in the following:

- **Product information.** Original exchange of product information among the supply chain partners was done by paperwork, such as paper catalogue, fax, etc. The problems caused by this included delays in information sharing and miscommunications among the trading partners. To add the product information into its information systems, a retailer has to re-enter the data, which may or may not come along with the product, manually. Then, keeping the data updated is an even harder task. For example, if some information has been changed since its last release, all the retailers in the industry (if they are lucky enough) have to check the data individually. According to UCCnet, 30% of data exchanged between suppliers and retailers doesn’t match up due to the inefficiencies of manual data entry and convoluted processes (see Figure 2.5 as an example of data synchronisation from [40]).

  This is an enormous problem for the industry, because incorrect data translates into an erroneous understanding of what retailers actually have on their shelves and what suppliers actually have in their warehouses. Faulty data translates directly into huge costs, missed revenues and, often enough, end-user dissatisfaction such as, for example, when shoppers find that heavily advertised products aren’t in stock. According to a case study conducted by Vista Technology Group (a CPG software provider), Shaw’s (a supermarket chain that has been serving New Englanders for over 140 years) manual, paper-based new item introduction process had no less than 17 steps. This meant a labyrinthine, time-consuming internal process; it also meant that suppliers’ product updates — even something as simple as changing the size of a can of tomatoes — had to go through the same manual, error-prone procedure before Shaw’s could get the data into its systems. EDI was first introduced for data interchange. Although EDI was originally designed to be a means to process transactions, it has been extended to facilitate sharing of some information like POS and on-hand inventory [10]. However, EDI has its own limitations. In addition, EDI does not verify data accurateness; it just transmits the data — “Garbage in, garbage out”.

Customer Demand and Transaction Information. Customer demand and transaction information serves as a critical source of information about future business, and is directly used for demand forecasting, manufacturing schedule, transportation planning, etc. Lee and Whang [11] provide an example of transaction information sharing in Seven-Eleven-Japan’s (SEJ). In the SEJ case, POS data are transmitted to SEJ headquarters, wholesalers, and manufacturers to monitor stocking levels, shelf space organisation, merchandising, and new product development. The recent developed Collaborative Forecasting and Replenishment (CFAR) is a new inter-organisational system that enables retailers and manufacturers to forecast demand and schedule production jointly [12].

Inventory information. Including inventory status and inventory decision models, directly affects the amount of orders placed to the immediate upper stream supply chain partners. However, inventory information seems to be more sensitive than customer demand and transaction information (see Figure 2.6), and the trading partners are less willing to share it. For example, manufacturers may not be willing to divulge their true inventory situation or may portray false inventory levels to discourage competitors from producing additional products or building additional capacities and suppliers may use inventory and sales data to get a better bargaining leverage. In practice, sharing of inventory information is implemented in different forms. CRP (Continuous Replenishment Programs) or Vendor-Managed Inventory (VMI) is a practice often employed by two neighboring partners in a supply chain. In a typical CRP relationship, the buyer shares his inventory data with the vendor and asks the vendor to manage his inventory within a
guideline. Wal-Mart’s Retail Link program [13] and Apple-Fritz Supplier Hub [11] are good examples of sharing inventory information. VMI system permits the manufacturer to maintain the retailers inventory levels. The manufacturer has access to the retailers inventory data and is responsible for generating purchase orders. The major difference between VMI and regular information sharing is that, under VMI, the manufacturer generates the purchase order, not the retailer.

![Sample system for customer transaction information](image)

**Figure 2.6.** Sample system for customer transaction information

### 2.5 Developing Collaborative Planning Activities

An important effort is needed in terms of both effectiveness and efficiency of the information flows along the chain. As we have seen in the previous section, the information systems are essential to managing a SC, and there is a wide consensus on the idea that the information systems integration is a must [14–18]. Now we will discuss the utilisation of these information systems to improve overall planning activities, which really creates a competitive SC advantage. We shall then review this topic and its latest developments.

In a traditional vision of the supply chain, demand flows up the chain (from each trading partner to its upstream trading partner) and products are moved in the opposite direction (see Figure 2.7). Delay times, distorted demand signals, and poor visibility of exception conditions result in critical information gaps and
serious challenges for supply chain managers, including misinformation and, ultimately, mistrust. For example, when partners lose faith in the forecast they receive, they typically respond by building up inventory buffers to guard against demand uncertainty. The disruption that results from dramatic, sudden changes in forecasted demand is amplified as it travels up through the supply chain. This “bullwhip effect” is responsible for much of the inefficiency in supply chains [19–20].

The need for certain coordination among the organisations which are participants in a SC should be translated into process and functions integration within these organisations and along the entire SC [6]. Most authors are of the opinion that the benefits of closing the information gap to form collaborative partnerships far outweigh the risk (financial analysis suggests that collaborative planning can lead to inventory reductions of 10% to 50% for each of the supply chain members).

The emergent e-collaboration tools enable the trading partners to exchange business information in supply chain operations, in a structured, agile (in real time), stable and leveraged way [9, 12, 21]. While the collaboration and synchronisation of all SC participants, both within and outside the firm, is now feasible, such supply chain integration needs to be carefully studied in order to improve its implementation. Notice that the term “supply chain automation and collaboration” has gained attention only in recent years, regardless of the fact that various forms of supply chain information exchange systems have been around for over 20 years; for example, Electronic Data Interchange (EDI) and Electronic Funds Transfer (EFT) technologies were first introduced in the late 1970s [22], as we have discussed in the previous section.

Issues involved in supply chain integration improvements have been studied from various perspectives in literature. The reader, for instance, is referred to the following examples:
Gavirneni et al. [18] analysed the benefits of the integration of information flows in a supply chain for a capacitated two-echelon SC;

Chen et al. [20] studied the importance of having access to accurate demand information for the SC upstream members;

Wikner et al [23], Towill et al [24], and Chen et al [20] have the benefits of integrating the SC and diminishing the demand oscillation transmission along the chain (the bullwhip effect).

Researchers agree that SC planning and control activities need to be considered for a proper SC integration [25] since they have an important impact on the effectiveness and efficiency of the SC.

When considering planning and control activities, the effectiveness of SC integration may depend on the integration process and on the tools used for the integration. This issue deserved attention in the existing literature. For instance, Stevens [16] presented an integration model with four phases:

1. baseline;
2. internal functional integration;
3. integrating supply and demand along the company’s own chain;
4. full supply chain integration. Described in terms of reaching a customer-driven supply chain instead of a product-driven one.

Hewitt [26] expanded Stevens’ model with a fifth phase that would be dedicated to better administration and re-engineering of the global business processes, pursuing the total effectiveness and efficiency of those processes.

Bowersox [2] also discusses the idea of two types of integration: internal and external. He concluded that the companies need to have a high level of internal integration to be good candidates for the extensive external integration within a supply chain.

By reviewing the practices in the industry under the perspective of supply chain integration, Bowersox found two types of generic integration schemes:

- The basic integration scheme, where the SC has developed a set of initiatives and agreements in order to improve connections with customers and suppliers. Under this scheme, benefits are reached through information sharing and common forecast and planning. Such agreements are implemented many times by establishing new venture companies or specific contracts with different members of the supply chain.

- The advanced integration scheme, which enlarges the collaboration horizon to reach a more sophisticated dimension. The idea is to integrate the value creation processes with a total end-customer driven orientation. The goal is collaboration to improve competitiveness through a coordinated effort that is, at the same time, feasible in a lean environment (therefore, it results in a reduction in the number of total resources of the supply chain). This advanced integration is normally implemented through profound long-term agreements between companies, and positions the supply chain as an effective competitive unit. Finally, Bowersox suggests that the creation of time and location benefits not
only requires sharing the information to allow suitable business agreements with that purpose, but also requires the existence of a suitable environment for financial transactions.

Another phase model to reach an integrated supply chain: is presented by Scott and Westbrook [27]. They propose three phases:

1. phase of study, where everything related to lead times and inventory levels is analysed for potential improvements;
2. positioning phase, to identify new opportunities emerging as a consequence of collaboration activities among the members of the chain; and
3. action phase, to put previous plans into effect.

Towill et al. [24] present an SC integration approach that is similar to that presented by Scott and Westbrook [27]. In their work, Towill et al. [24] also use operations management principles to reduce the amplification of the demand signal along the chain when the integration is produced.

Ellram and Cooper [14] identified a set of characteristics that would influence a company’s decision to be a part of an integrated supply chain. These characteristics are related to the current level of internal process and functional integration of the company, and with the required level of inter-companies integration for the competition with other SC. Therefore, the importance of those characteristics may differ along the SC integration process [6].

As mentioned above, advanced integration not only requires sharing the information to allow suitable business agreements with that purpose, but also requires the existence of a suitable environment for financial transactions.

The integration of SC financial flows is also becoming a common topic in the literature because of its impact on the entire supply chain performance. Automated freight payment software is available to pre-audit, summarise, batch, and pay carriers by electronic checks on a scheduled basis [28]. There is evidence [29] that the use of information integration in conjunction with buyers’ and sellers’ banks to transfer funds can improve cash flow and reinforce the “partnering” relationship between the parties in the supply chain. Furthermore, in many supply chains, credit provision is a key factor in supplier choice among distributors and their customers [30]. Suppliers often finance their customers’ transactions through the extension of free credit (in Neals’ study, only 1% of the distributors charged interest for credit given to their customers, only 5% were charged interest for credit taken, only 12% offered more generous price discounts when customers did not take credit and only 5% received a larger discount when they did not take credit from suppliers).

Clearly, cash flow is affected by the terms of sale, and buying and selling companies often have a different capital cost, which raises the opportunity of improving supply chain performance by having the company with the lowest cost of capital own goods for as long a period as possible [4]. Frequently a financial organisation can provide the “banking function” financing shipments by purchasing those receivables, at a discount, eliminating the seller’s extension of credit terms and their incurring of payment delays from letters of credit [31].
2.6 Suppliers Management. Expanding the Purchasing Role

Some industrial sectors, such as hi-tech, face volatility from unpredictable demand and very short product and technology life cycles. Organisations within these sectors develop flexible procurement strategies to deal with this uncertainty.

The numbers of suppliers available, plus a range of tiered contract structures, are critical to meeting the need for flexibility. In such sectors, worldwide capacity for certain parts may be very limited relative to demand at any stage of the commodity’s technology life cycle. The global supply is also vulnerable to unexpected events (such as natural disasters, social-political changes, terrorism, and economic disasters) that may create scarcity in worldwide supplies of certain commodity parts.

When products are strategically important for the company, multiple sourcing of strategic parts is used to decrease exposure to potential loss, but in addition companies are now combining supplier contracts types to ensure availability of supply at a competitive cost. This role, creating and managing tiered contract structures for supplier management, is lately becoming a strategic topic, which is necessary to assess the capacity of the organisation for high performance [32].

A strategic part is considered as a part that is critical to product success, with global price and availability driven by external market forces beyond the buyer’s control. According to Clark and Fujimoto [33], among other things, organisations need to develop functional specialisation in the area of purchasing strategic parts. This specialisation can of course be shared among many projects running simultaneously, but it is a must for an effective structural design of the organisation as a whole. In this sense, Fujimoto considers that functional specialisation, besides internal integration (inter-functional coordination mechanisms) and external integration (informational consistency between the organisation and the market) are key aspects to take into account.

This expansion of the purchasing role is required to secure an adequate supply in global markets, while protecting profit margins under pressure from global competition. Giunipero and Brand [34] developed a framework describing the stages of the evolution towards supply chain management (SCM) and how procurement would change within that framework. They defined four levels of development of the purchasing role:

1. traditional; emphasizing vendor selection and lowest possible price;
2. partnership/relational; building closer relations with a supplier to reduce total cost and minimize risk in an atmosphere of trust;
3. operational; (material logistics management), coordinating material and information flows to improve quality, inventory levels, and overall cost;
4. strategic; (integrated value added), applying flexible business processes to a given situation, and thereby achieving speed, flexibility, and competitive advantage in the marketplace.

In large multinational companies, the current movement to consolidate supply chain management across business units in geographic areas, and the
integration of product units into customer-facing solution businesses by target market, offers new possibilities for strategic sourcing and a contract portfolio.

The common idea is to create consistent relationships between the suppliers of a commodity-type part and the various procurement organisations, locking in competitive prices for the same contractual terms, tracking different product part specifications to a corporate-wide technology strategy [35], etc.

Competitive procurement strategies [36] focus on the buyer’s intrinsic bargaining power, which allows buyers to leverage purchasing on a global scale, minimise internal costs, and improve the company’s competitive advantage. In this context, global sourcing [37] is a fundamental corporate strategy aimed at maximising the utilisation of worldwide material resources.

2.7 Approaching Markets Differently

The evolution in the way that businesses approach markets has been a frequent literature topic in recent years. For a long time, many companies have mainly focused on their products and processes improvements, trying to develop their technology through creativity and innovation, looking to be in the best market position for every potential customer. However, this sometimes resulted in a poor strategy to attract and retain many customers. Lack of external view and misunderstanding of what the customers really wanted were sometimes the causes of very negative and expensive experiences.

Moreover, in a modern SC scenario, intermediate firms along the CS are also customers in the process; therefore it is also important to ask how the creation of value for intermediate customers influences the behaviour in the channel [4]. Some authors [38] argue that in an SC context, customer success rather than customer satisfaction is the objective of the value-creation process, requiring a firm understanding of what is important to its customers’ customer and help immediate customers to deliver that value downstream.

In the hi-tech sector, marketing intelligence and customer knowledge will not only help in the way a business may approach new markets, but will also improve understanding of demand generation and forecast, as a main input of subsequent collaborative planning processes within the entire supply chain. This will ultimately become a key tool to strengthen risk mitigation strategies.

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