Chapter 1 Inter-organizational Cooperation in Supply Networks

This chapter first describes basic objectives of establishing cooperation before concentrating on collaboration in supply networks in a next step. Then possible usages of information and communication systems in supply chain management are introduced.

1.1 Forms and Motives of Building Cooperation

There are many examples for inter-organizational cooperation, such as the merger of airlines to global alliances, the cooperation between original equipment manufacturers and vendors in supply chains or the joint software development within open source projects. In addition, further cooperation forms exist, for which the partners either pursue a common goal or the one party helps the respectively other to reach their goals ("You scratch my back and I'll scratch yours").

In this book, cooperation is an implicitly or contractually agreed collaboration between independent companies. Here, we assume that these agreements are made for a medium- or long-term cooperation and require investments from the participating companies (Bakos/Brynjolfsson 1993). These investments, for example, can be the time spent for negotiating outline agreements or investments in information and communication technology.

The economic effects, resulting from cooperation for the actors involved, are ultimately achieved by effectively combining resources, such as production plants, employees, or information, for example. The following advantages can be achieved:

- *Cost reductions* are regarded as a classic advantage of cooperation for the partners involved, which can be realized in particular due to economies of scale or economies of scope.

- The *time* factor is another reason for establishing cooperation agreements. The term "time to market" indicates the interval from an idea or vision all the way up to the product launch. A large amount of empirical research indicates that the life cycle of products is becoming increasingly shorter and there is a statistically significant relationship between the time of entry to the market and the market share. For this reason, cooperation agreements are attractive because the involved partners, for example, can perform tasks in parallel, which leads to reduced development times.
- The *reduction of risks* has also been frequently mentioned as being a motivation for cooperation between companies. A division of effort can also lead to a shared risk of failure. This applies for instance to projects in research and development, where a large potential risk is involved.
- *Quality advantages* through cooperation can, for example, permit alliances of airlines, car rental companies and hotels to provide additional services, such as a coordinated availability and return of rental cars and the crediting of bonus points.
- Cooperation can also result in an increased *flexibility* by permitting access to additional production capacity of the partner (flexible capacity expansion).
- In particular the linking of employees and their know-how open up new potentials of an increased *innovation activity*. Product innovations may differentiate the product offerings and thus provide additional competitive advantage.
- Cooperation can simplify the *access to new markets* as well as resolve traditional industry limits. Or, cooperation can provide a high market share, which then increases the barriers to market entry.

1.2 Inter-organizational Cooperation in Logistics: Supply Chain Management

This book focuses on inter-organizational cooperation in logistics. The actors of a supply chain consider themselves as partners that cooperate with each other in order to achieve their common purpose. The center of attention here is to better accommodate the demands of the end customers, for example, through a faster product provision. Furthermore, potentials for rationalization can be tapped. The actors of a supply chain are suppliers, manufacturers, wholesalers, freight forwarders, warehouses and merchandise distribution centers, logistics service providers, and the retail sector. Examples for cooperation in the supply chain are:

- Within partnerships, suppliers and recipients work together on the product development, starting with the initial idea, including the process development, the implementation and market launch of the product.
- Suppliers are compensated based on the commercial success of the producer. An example is the development of the Smart Car.
- In the goods flow from the intermediate product provider to the final assembly company, only one warehouse is jointly operated; thus warehouse stocks and capital tie-up costs can be reduced.
- Logistics service providers cooperate with manufacturers for the management of a supply chain. The cooperation between Schenker AG and Daimler-Chrysler AG for the overseas production of the A-Class model (refer to section 7.1) serves as an example.

The concept of supply chain management – unlike classic business approaches – emphasizes the integration and improvement of business processes beyond company limits, that is, from the provision of the material components up to the delivery of the product, possibly manufactured in several intermediate stages, and the respective services to the end customer (Oliver/Webber 1982; Cooper et al. 1997; Handfield/Nicols 1999; Helms et al. 2000; Knolmayer et al. 2002).

Cooperation in logistics, however, is also the central focus of the Collaborative Planning, Forecasting and Replenishment (CPFR) concept (refer also to Knolmayer et al., 2002). This concept aims at improving the inter-organizational partnership between vendors and customers in the supply chain through jointly managed information and cooperatively managed processes so that an excess profit challenge results for the participants. The focus here is on reducing the inventory levels while improving the delivery service. The principle part consists of the "CPFR Voluntary Guidelines" that were prepared by the CPFR Committee (refer to http://www.cpfr.org). This committee consists of representatives from approximately 70 industrial and trading companies.

The most important guidelines of the CPFR concept are:

- *The partners develop rules for the cooperation.* These include agreements on the shared use of information and arrangements on the rights and obligations of the partners, and also for the criteria and metrics to be used to measure the effectiveness and success of the cooperation. In particular, a general plan is devised, in which the participants are assigned "core process activities". The guidelines moreover recommend to develop a common business strategy, which specifies, for example, minimum purchase order quantities and ordering intervals as well as agreements on marketing and sales actions.
- *The cooperating companies set up a joint forecast on the requirements of the end-customers.* This common forecast can be prepared by aggregating the individual forecasts of the individual members in the supply chain. The

forecasts can be determined, for example, using point of sales data from traders, stock issues from distribution centers, and incoming orders at the manufacturer. The shared forecast forms the basis of the plans to be reconciled.

Cooperation between the actors, on the one hand, could thus improve the entire supply chain. On the other hand, an improvement of the overall result may possibly only be achieved in this case by impairing a member of the supply chain. This leads to the following basic problems:

- How are the business risks calculated and assigned in a supply chain?
- How is the added value of a supply chain cooperation calculated?
- How are the additional contribution margins allocated in a supply chain?

This, for example, raises the question whether it is possible to replace a manufacturers distribution warehouse and a procurement warehouse for a subsequent assembly plant with a warehouse operated together, and so reduce inventory held along the supply chain. Such changes frequently also have negative effects on both upstream and downstream companies in the supply chain. Which participants must now carry the inventory risks? And assuming that this activity produces a cost reduction and the resulting sales produce an increased profit: how will the resulting added value be distributed?

Therefore, it is possible that the supply chain as such is flourishing, although individual partners could realize lower costs or higher revenues without the cooperation. The added value of the entity and the possible losses of the individuals must be adequately identifiable to allow a value distribution acceptable for the members (which does not mean that it must be a "fair" value distribution).

A further methodical, to a large extent not yet clarified problem is that many companies are members of several supply chains in parallel. 62 percent of the companies surveyed within an empiric analysis recently conducted in the automotive industry stated to be active in several supply chains (Buxmann et al. 2003). This in turn means that companies that cooperate as part of a supply chain, might also be competitors in other value chains. The literature has coined the term "coopetition" (from the words "cooperation" and "competition") for this situation (Brandenburger/Nalebuff 1996). An example for coopetition is the cooperation of the competitors Volkswagen and Ford: Here, the models VW Sharan and Ford Galaxy were developed in cooperation. Nevertheless, both companies remain competitors on the market. Coopetition, however, can also take on a different form: individual participants of a supply chain can be simultaneously engaged in several competing value-added processes. For example, in the automotive industry one can find exactly this constellation for tire manufacturers.

How can a company meet the challenge of simultaneous cooperation and competition?

Currently, no theory-based procedures exist, which have been tested in practice to answer this question. Basically, the issue revolves around the interconnection of various supply chains: What positive network effects can be ideally achieved for all participants through the connection of the processes belonging to different value chains? Nowadays, in many cases it can be observed that automobiles of a manufacturer have motors of a competitor built in. This fact permits, for example, a motor manufacturer to increase the utilization of a new factory by supplying competitors to such an extent and thereby achieve a profitability increase so that any possible growth limitations in its own end-product market are over-compensated.

Up to now, we talked about supply chains. Today we can observe, however, that classic supplier chains are increasingly replaced by network structures. This can have the effect that, for example, an actor is member of several supply chains, a manufacturer procures a certain material component from varying (previously quality checked) suppliers through reverse auctions, or network-like production structures are established (Gebauer/Buxmann 2000). The following figure shows a classic supply chain on the left and a supply network on the right.

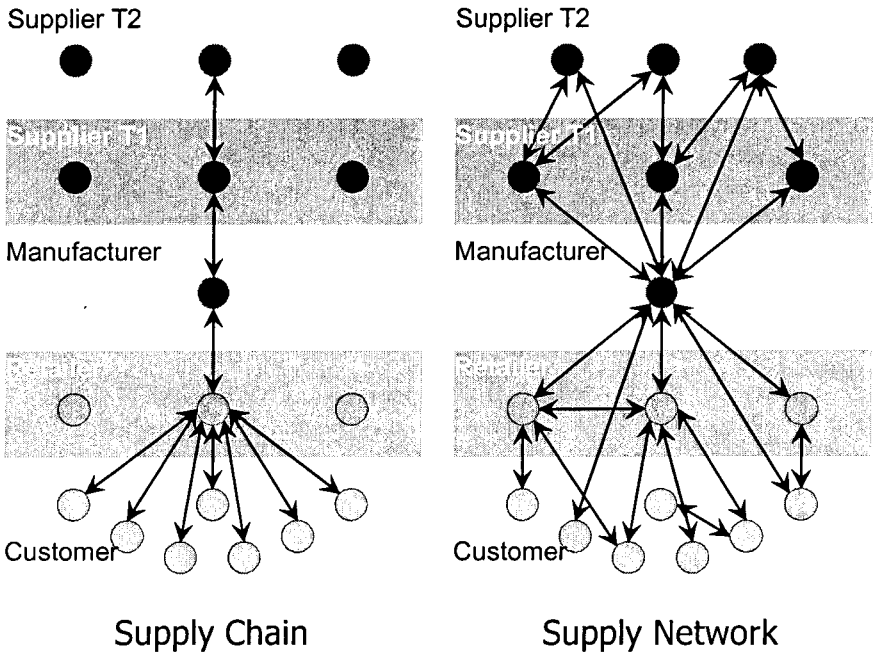

Figure 1.1: Supply chain vs. supply network

Thereby, a supply chain is a special case of a logistics network or supply network, that is, the treatment of supply networks includes the analysis of supply chains. Below we will therefore also refer to supply networks.

1.3 Using Information and Communication Systems in Supply Chain Management

An integrated data processing is a precondition for the design of inter-organizational business processes in supply chains. Ideally, all internally and externally involved parties are connected with one another in real-time, and exchange required information without delay. The automation of the data flows and the exchange of standardized formatted data, for example using EDI, makes the classic postal route increasingly superfluous. The computer-to-computer coupling from the consumer to the supplier permits not only an automated data transmission, but also a mutual immediate access to the specific scheduling files. If the supply chain is interrupted, for example, as the result of the failure of a machine at the supplier, the system forwards the appropriate information to all parties involved in the supply chain and so permits all involved companies to initiate an alternative planning, avoiding the consequences of the failure, for example, by activating an alternative supplier. After all, it is the information flow, which takes over the control of the goods movements.

In this case, it is possible that information flows in opposite direction from the goods as well as in the same direction as the goods. An example for the first-mentioned case is a delivery schedule that a manufacturer transmits to his supplier. Vice versa, information and goods flow in the same direction if a supplier transmits results of quality assurance activities to the manufacturer, for example. Information and goods flows in a supply chain are represented in the following figure.

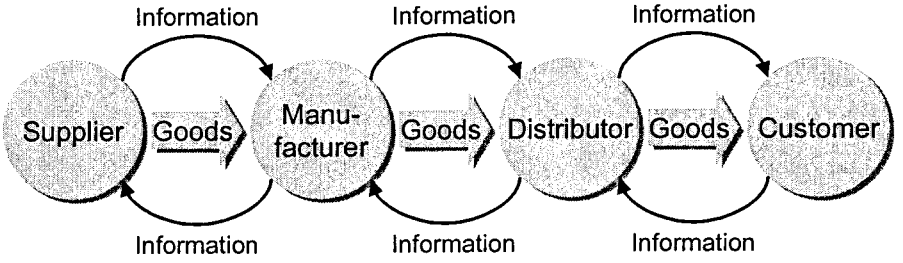

Figure 1.2: Information and goods flows in supply chains

The retail sector can serve as an example for the integrated consideration of goods and information processes: In this scenario, the sales data of various articles is collected through scanner cash desks at the "point of sale" and without delay passed on to the upstream members in the supply chain. The resulting improved sales forecasts enable – among other things – a better planning of the deliveries from warehouses and branches to the wholesalers and the manufacturers. The

integrated control of the entire supply chain permits a reduction in the inventory levels and in the throughput times, which in turn reduces costs, improves the delivery service through an improved availability of the products, and increases the quality of the products, through, for example, a higher product freshness in the consumer goods industry.

Just-in-Time (JIT) production is another example. This principle is applied, for example, in the automotive industry, where suppliers provide the required goods within a short time frame after the request for delivery. In analogy to the physical level, the JIT concept can also be applied to the processing of information because the transport of information is subject to logistic considerations in the same way as the transport of real goods.

The efficient use of information and communication technology (ICT) as well as the willingness of organizational networking take on a key role when it comes to controlling the information and goods flows between the partners in a supply chain. Looking at the development stages in the ICT, it becomes evident that the trend is shifting from internal support to inter-organizational cooperation. In the 1960s, companies increasingly began to use ICT to support specific areas. Initially, these were often the accounting and manufacturing areas. In a next phase, support was also provided to cross-functional areas. This resulted in an integration of different functions, such as cost accounting with financial accounting. Since the mid-1980s, the support for inter-organizational integration has been a trend in ICT. Some ten years later, this development was intensified through the Internet which provides a worldwide available and cost-saving infrastructure for carrying out inter-organizational business processes based on open standards.

The basis of the organization and operation of inter-organizational processes in supply chains is the use of common standards at different levels. Here, Internet standards, such as HTTP, XML, Java, HTML, nowadays constitute the generally accepted state-of-the-art. Considering standard business software, these standards are more or less supported by the vendors on this market. A differentiation is made at a higher level, for instance, with the design of the data or the process models.

A common data management of the partners involved can be set up based on such open standards in order to ensure the provision of the decision-relevant information. In particular, this concerns the used communications standards as well as the type of the data maintenance and transfer. This includes, for example, the usage of EDI for the electronic exchange of business documents between the partners of a supply chain. Furthermore, information can be provided by means of a common data storage, with all participants being able to access the data pool. Modern database systems and data warehouse solutions provide various functionalities for information retrieval based on Internet standards.

Supply chain management systems enable cooperative planning of processes. These are, for example, common location, sales, production, procurement, and distribution resource planning. The vision is that an excess profit challenge results from this cooperative planning, as illustrated in section 1.2. Known suppliers for supply chain management software are i2 Technologies, J. D. Edwards, Oracle as well as SAP. Many of these suppliers provide an interface to corresponding ERP software. From an economic perspective, indirect network effects exist, which result in a competitive advantage for SAP as market leader in the ERP software area.

Finally, electronic marketplaces (EM) nowadays partially provide functionalities for the joint corporate planning in the business-to-business area, too – often under the keyword "Collaboration". These marketplaces thus combine the support of the data exchange as well as the processing of transactions with supply chain management functionalities. With partners often collaborating on a long-term basis, EM take on a cooperative character. This is achieved, for example, by the participants having to pay fixed charges over a longer period of time and thus contributing to the infrastructure costs.

This book concentrates on the support of inter-organizational cooperative business processes with the aid of SAP solutions. It will dwell on basic standards (chapter 2) and data management (chapter 3 and 4) as well as on cooperative planning within supply chain management (chapter 5) and electronic marketplaces (chapter 6). In addition, five case studies from the automotive industry will be presented (chapter 7). The structure of the book is illustrated in the following figure.

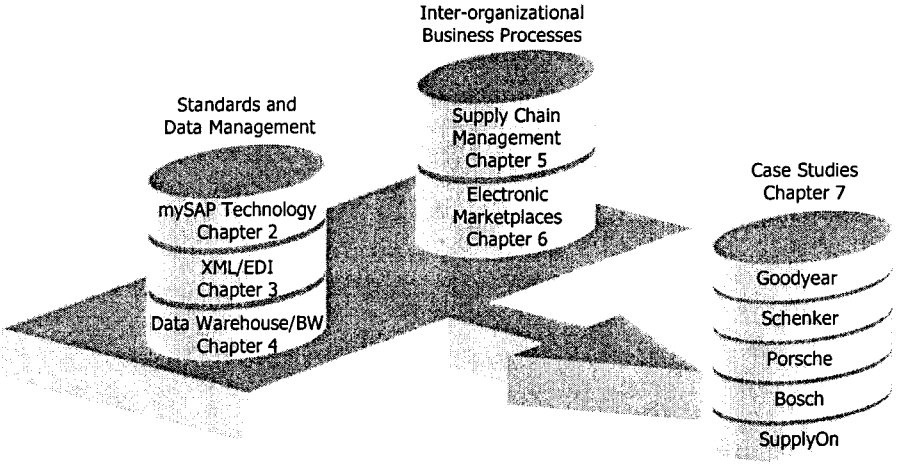

Figure 1.3: Structure of the book