Constraints and opportunities to change through overlapping supply chains networks

Susanne Hertz
Jönköping International Business School

ABSTRACT

Increasing integration of the supply chain network is often seen as a prerequisite for further development of an effective and efficient supply chain. Integration of a supply chain network necessitates closer relationships between partners in the supply chain. However, most firms with a variety of product lines and a differentiated customer base are part of several supply chains, which often overlap. As these supply chain networks are subject to change, the degree of interconnectedness will impose constraints and provide opportunities to managing the change process.
The purpose of this paper is to discuss the implications of constraints and opportunities for the development of one supply chain as a result of the direct and indirect effects on other overlapping supply chains. The paper is mainly based on two large industrial case studies from the automotive and construction industry, but is complemented by studies from TPL firms. The theoretical approach is a combination of the network approach and supply chain management literature which discusses changes of integration in inter-organisational collaboration, systems, activities and resources.

BACKGROUND

The increasing integration, the growing variety of products/services and more mergers and acquisitions in the market is influencing the design, number and type of supply chain networks (SCN).

An increase in the degree of integration in the supply chain network is often seen as a prerequisite for the development of an effective and efficient supply chain. Outsourcing, the focus on core competence and international competition are common underlying driving forces. Such a change normally involves both closer cooperation between partners and higher coordination of the activities and resources of the chain.

Firms are part of more than one supply chain and the number and types of supply chains are growing. Higher customer orientation and the trend towards customer order production have increased the variety of product/services adapted. Since partners, the resources and activities are often coordinated between different supply chain networks, the overlap between supply chains increase.

Furthermore, strategic alliances, mergers and acquisitions, cause an increase or decrease in the overlap between different supply chains. Diverging or converging technologies may also influence the degree of overlap between supply chains.

The combination of increased integration, the increase in the number and types of supply chains and changes in the overlap are likely to cause effects for firms in supply chain networks.

Most studies of supply chains are focused on one specific supply chain and the possibilities of increasing the effectiveness and efficiency in that supply chain by changing the structure and processes within the chain. However, since firms are to an increasing extent, part of more than one supply chain, a wider perspective is important in order to understand the effects of change in supply chains.

The purpose of this paper is to discuss the effects when one focal supply chain integrates with an overlapping supply chain. Some of the questions and answers that we will pose include:

1. How would changing partners, re-engineering SCN or inducing customers order production in one supply chain actually influence an overlapping supply chain?
2. How will the reactions of the overlapping supply chain influence the changes in the focal chain?
3. What effects will alliances, mergers and acquisitions or changing technologies have on the supply chains to which they are interconnected?
4. What constraints and opportunities will impact on the integration of the focal supply chain with the overlapping chain?

Our theoretical basis is taken from the network, distribution and supply chain management perspectives. Empirically, we use examples from automotive, construction and transportation industries.

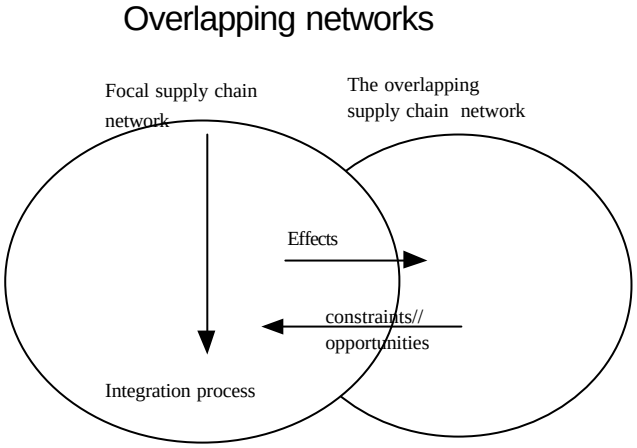
THEORETICAL APPROACH

Within the three perspectives of network, distribution and supply chain management, our focus is on integration, inter-organisational collaboration, coordination of activities and resources and overlapping networks.

We will start by discussing how to depict supply chains and networks. Then we turn our discussion to the two different concepts of overlap and total network of the firm. We

then discuss the different ways of integrating SCNs and conclude by discussing possible effects of integration changes in terms of constraints and opportunities, due to overlap between supply chains (Figure 1).

Figure 1. Overlapping networks



Depicting the supply chain and supply chain network

How do we depict a supply chain? Where do we actually start to measure?

If we take the marketing perspective when depicting supply chains, we should start from the customer and go upwards in the chain (Christopher, 1998; Aker, 1997). In some other cases, the product line or the physical flows are the basis for the depiction of the supply chain (Mentzer, et.al., 2002). Another more simple way would be to depict a supply chain by studying the mere frequency and consistency in flows.

To depict a chain seems easier when we talk about a car, where we can focus on one type of product and a high degree of integration in the chain. However, for less complex products like beer or clothes, the supply chains might have one or several de-coupling points and be more difficult to follow. Furthermore, the strategies of the dominating firms in the supply chain also play a role in deciding what firms and flows are seen as being involved in the supply chain network.

A supply chain is commonly defined as a network of firms involved in upstream and downstream flows from sub-supplier to ultimate customer (Christopher, 1998; Mentzer, et..al, 2001). However, these definitions do not consider the fact that, by definition, the boundaries are blurred in a network, since it is an open system and firms are

interconnected in a wider context as well. Delimitations of networks are made in different ways. Either the delimitation is based on a focal firm perspective or a spatial delimitation, or based on technological interdependencies (Mattsson, 1998). As for the supply chain, the basis would be the technological interdependencies from sub-suppliers and the ultimate customers.

Since not only firms are interacting but also their resources and activities in the network perspective (Håkansson and Snehota, 1995), the depicting of supply chain networks should include these considerations. We have chosen to depict the supply chain starting from a specific customer or group of customers for a type of product/services offered. The chain includes a combination of resources, activities and actors that are involved in delivering these products/ services to customers.

Overlap and overlapping processes

We stated earlier that many firms are part of several supply chain networks and that these networks often overlap. Since the network approach assumes that actors, activities and resources are interacting, interconnected and inter-linked, not only the supply chains but also the overlap should be considered from this perspective (Håkansson and Snehota, 1998).

Mattsson (1998) discusses overlap and overlapping processes with focus on actors and relationships that overlap between different networks. He states that, "*the actor based overlap influences the strategic actions and network processes in both of the overlapping networks.*" His definition of an actor based network overlap is that "*some actors of one network are related to other actors in another network*".

We would like to put it differently by saying that an overlap of actors between two networks may exist when the same actor directly or indirectly can be seen as part of two supply chain networks. Examples of this would be when a firm sells its products through the same wholesaler or retailer, or uses the same third party logistics provider. An overlap of resources could be defined as when two different supply chain networks are making use of the same resources, or the resources are very closely related between two supply chains. This can be exemplified when two product lines are using the same machines, same warehouse, or the same people on their way to the final customer. Another example is when two chains have developed a new IT system together. Such an overlap would not only include an overlap in resources, but also include an overlap in

activities. An overlap in activities can be seen as creating or following the same routines or rules, creating new common activities, common coordination and control of resources, or having closely related activities for two chains.

The overlap can take place at any level in the supply chain network; i.e. with 1st or 2nd tier suppliers, manufacturers, sales agents, wholesalers, distributor or retailers. It can also include complementary service organisations if the coordination of goods or services takes place.

The total network of the firm and the supply chain networks

Up until now, we have focused on the supply chain network. However, when discussing the single firm, another factor to take into consideration is the total network that normally spans over several supply chain networks.

Relationships between firms are often long-term, which gives the network a certain stability. Several international network studies have shown that firms prefer to develop their existing relationships rather than establish new ones (Håkansson, 1982). Invariably, there is increased risk in changing to a new relationship. The knowledge developed, the common routines established, people involved, the resources invested, etc., all lead to an inertia in the network (Ford, et al, 1998; Hertz and Mattsson, 1998).

This implies that an established relationship in one supply chain might be preferred over a new relationship. This could mean that the number of overlapping chains might increase over time, if the number of supply chains increase.

The total network of the firm implies that supply chains might be indirectly connected because they are part of the same total network, or directly connected via an overlap when two or more supply chains are using the same specific actor in that total network. Both these might play a role when discussing the possible constraints and opportunities to changes in one supply chain network upon another.

Types of networks and network integration

The different types of networks are an important factor to take into consideration when discussing the effects of the integration change on overlap.

Supply chain networks may be classified in different ways. Harland, et.al. (2001) discuss whether networks are the efficient or responsive type. The efficient network is seen as a routinized network, while the responsive type is more dynamic. These networks have either a high or a low degree of focal firm influence. They are different

in the aspects of information processing, resource integration, partner selection, motivation, risk and benefit sharing, decision making and conflict resolution, and knowledge capture. While the efficient and more routinized network focuses more on cost and quality factors and is more frequent in mature industries, the dynamic networks have innovations as their first priority.

Chopra and Meindl (2001) also classify supply chain networks as having a responsive or efficiency focus and while they include the dominance of the focal actor, they add the dimension of uncertainty in demand. High certainty in demand is commonly seen in more mature industries.

In this case, integration of the efficient and more routinized focused network, where one focal actor dominates, would be the automotive industry, while telecom and electronics industries are more dynamic and responsive but face large demand uncertainty.

However, supply chains can also be classified according to their external design like being broad/narrow or long/short (Harland, 1999). Another classification could be by closeness or proximity; the closeness or looseness of the cooperation between the firms, which specifically discusses the degree of integration within the relationships. The network is then seen as tighter or looser in its character (Mattsson, 1987). We assume that change in the degree of integration might have different effects depending on the type of network that we are discussing.

What do we mean by integration? Integration is an important change process in supply chain networks that actually means a transformation from loose cooperation to a higher level of internal fit, involving a higher level of synchronisation between the partners of a supply chain. Integration makes it possible to act collectively in the supply chain. The integration of a supply chain would involve information sharing, common standards, common culture, coordination of interdependent flows, joint planning, joint mission, joint product development and/or an increase in social contacts (Ludvigssen, 2000).

We know from earlier studies that trust between firms plays an important role for the possibility to integrate and to gain the efficiency and effectiveness.

Integration can take place in dyadic relationships and stay on that level or spread to others, or it can involve the whole network through a merger, acquisition or strategic alliance. When there is high interconnectedness between firms in an industry, the

domino effects may even occur as a result of firms leaving partners, becoming tied to a competing firm or network, and taking over other relationships (Hertz, 1998).

We use three typical ways of changing the degree of integration in supply chains that make use of different designs of supply chains (Hertz, 2001). The first is to change the degree of integration between existing organisations in the supply chain network, either by making the relationship looser or closer. An increase in the degree of integration in this sense could be exemplified by a change in lead-time without reengineering. The change can take place on an actor, activity or resource level.

The second would be by making the supply chain network longer or shorter. To extend the supply chain can be exemplified by internationalisation or globalisation involving more firms or activities in the supply chain and longer distances. It could also involve more representatives or agents, but also involve a new warehouse in another part of the world. To make it shorter could mean cutting out echelons or agents in the supply chain, changing to a central warehouse, or having direct transport instead of having many stops along the way.

The third way would be to narrow or to widen the supply chain. Narrowing can be exemplified by outsourcing and a reduction in the number of suppliers, while widening could be adding an extra supplier.

While change in the second case of shortening or extending discusses the number of levels being part of the SCN, the third case of narrowing or widening is a question of reducing the number of players or reducing the spread of the flows at each level of the supply chain (Figure 2). These different types of supply chain networks might be adapted both to dynamic or responsive firms with high demand uncertainty and to efficiency focused firms with high product stability.

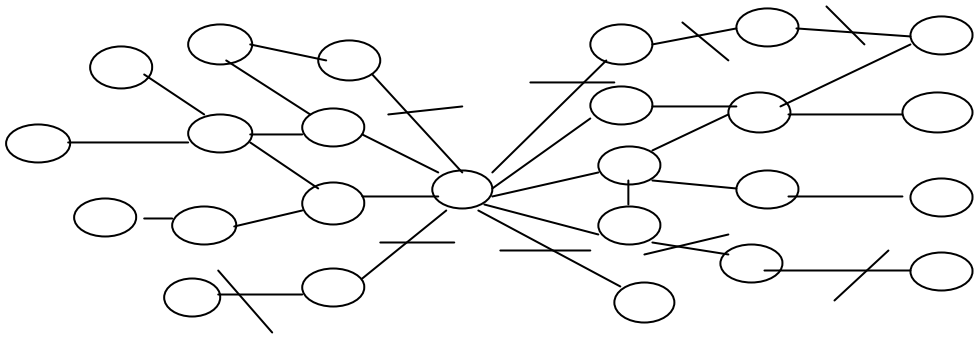
Possible effects of changes in integration in a supply chain or channel

What may be the possible effects of integrating one supply chain with another and what constraints and opportunities will the other SCN impose on the focal chain?

First, taking the network perspective, the effects might take place on an actor level or on an activity or on a resource level. The actor level has to do with relationships and changes in relationships in terms of integration.

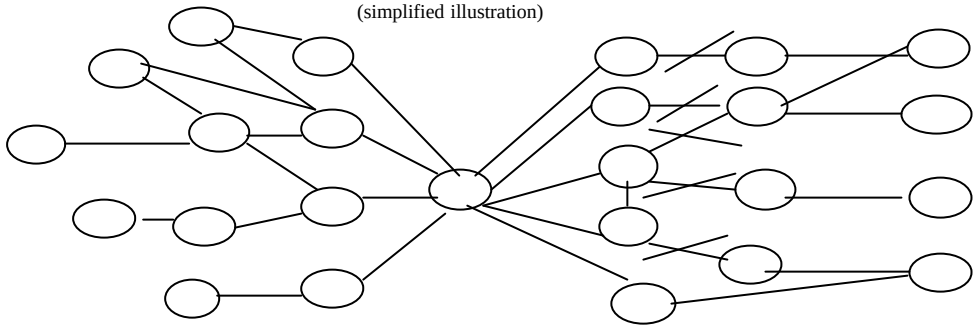
Increased integration by narrowing the supply chain network

(simplified illustration)



Increased integration by shortening the supply chain network

(simplified illustration)



Depending on what type of change in terms of closer/looser cooperation, widening/ narrowing or shortening/extending, it seems likely that the effects of the overlap might differ. One important reason will be that, in the cases of narrowing/widening and shortening/extending, new actors, activities and resources will be added or existing relationships broken.

Gadde and Mattsson (1987), found that widening was a common way to switch suppliers. By taking on an additional supplier, the existing one could be phased out gradually. Narrowing, on the other hand, has recently been a common way of breaking relationships with suppliers who perform poorly and getting closer to fewer, more strategic suppliers. In both cases, the effects of integration within the focal supply chain network are large. However, we do not know what effects this could have on an overlapping network.

By necessity, when discussing networks and supply chains, we want to discuss not only effects on actors, but also the effects on resources and activities.

In earlier studies on integration in organisations (Schott-Larsen, 2001; Ludvigsen, 2000; Hertz, 1993), many different parts seem to be involved. Therefore, the effects can influence many different aspects such as economic, financial, organisational, competence, etc.

From a networks perspective, we have also discussed the problems of inertia, which means that firms are usually unwilling to change their relationships to another solution. Their existing routines, investments and knowledge are tied to a certain relationship and they are reluctant to change. A change to another supply chain might lead to a decreased or increased overlap, which, in turn, causes effects on both the relationship and/or the network.

We know that increased integration of a supply chain often demands greater exclusivity and deeper cooperation, both of which engage a higher degree of resources. How will firms within a specific supply chain cope with this?

If the existing supply chain partners are gradually tying themselves to your competitors, you may want to find new partners. Studying each supply chain from this perspective and combining it with the focal firm network will help to understand the problems and opportunities faced from overlapping supply chains.

After discussing the concepts of supply chain network, overlap and the total network of the firm, the existing theories indicate that overlap should influence the changes within the supply chains. However, we do not know much about the typical effects of the overlap, other than that they may influence several different aspects.

To what extent does the total network of the firm play a role? After presenting three alternative ways of integrating supply chain networks, we ask ourselves to what extent these influence the effects of the integration taking place in the supply chain network. Now we turn to three illustrations of overlap in supply chain networks.

EMPIRICAL EXAMPLES

We have three examples which illustrate different integration changes in one supply chain having effects on another.

The first one is from the automotive industry when Volvo Car and Volvo Trucks were part of the same group. The supply chain networks for the two firms overlapped in some

places. The network of the automotive case is going through a process of narrowing and shortening the supply chain of Volvo Cars.

The second case is from the construction industry, which is about a wholesaler and its attempt to create a generic product leading to the elimination of an agent from the supply chain.

The third is a case of diverging technologies between airfreight and trucking services, causing a specialisation of airfreight and closer relationships with many of the existing actors but also narrowing the system.

Volvo case

A market downturn, a broken alliance with Renault and financial deficits forced Volvo at the end of 1993 to rethink and find more radical ways to cut costs and increase customer service.

A large re-engineering project was established to reduce lead-time from four weeks to a fortnight for the total order fulfilment process; i.e., from ordering the delivery of the customised car to the final customer.

Having gone through a number of projects with the goals of shortening the lead-time, including JIT, the supply chain was already integrated on the supply side. However, in order to make the 50% reduction in lead-time, Volvo needed to integrate not only the supply side but also the distribution. The process involved changes on all levels of the supply chain network. The information systems were linked and customer orders were sent directly to the factories. A higher visibility within the system was created through forming stricter rules and routines in the processes. The total logistics system was changed. Inventories were reduced, warehouses turned into terminals, transportation and delivery times changed, and the sales and market systems turned from a push to a pull system. Postponement of final assembly as late as possible became vital.

Closer relationships with suppliers, transport firms and dealers became increasingly important to create a more narrow but also, where possible, a shorter supply chain. Furthermore, much closer cooperation was necessitated within the different functions of the Group. Marketing, product development, production, purchasing and logistics coordinated their activities. The whole organisation of Volvo had to change from a functional to a process-oriented organisation.

The result was shortening the supply chain by cutting out certain echelons in the physical flow and changing the roles of many firms in the downstream part of the supply chain network.

In this process of integration, Volvo Transport was deeply involved. The main stakeholders in Volvo Transport were Volvo Truck, Volvo Car and Volvo Penta. The role of Volvo Transport was to coordinate the transport flows of the group firms in an efficient and effective way. In order to do this, it relied heavily on external transport firms buying transport services (for almost 4 billion Sek/year).

When Volvo Car (VC) re-engineered its total supply chain network, the logistics and the transport flows had to go through radical changes. VC wanted dedicated transport flows with milk-runs from the Swedish suppliers. This was negotiated between VC, Volvo Transport, an external transport firm and the Swedish suppliers.

The complication in this case was that Volvo Truck had coordinated transport flows with Volvo Car because of geographic proximity and sharing the same suppliers. Now VC wanted to pursue its own interests. Thereby, the established routines, consolidation and deliveries with Volvo Truck could not continue as before. This caused extra costs for Volvo Trucks, but also extra work in changing their routines and rules. New people were assigned and new competencies developed. The effects were large for Volvo Truck in the total network using the same actor.

As a result, Volvo Trucks could expect lower service, increasing costs and lower priority by both Volvo Transport and the external transport firm. This was something that it did not want. At the same time, VC expected to get deliveries more adapted to its situation and routines and to get faster and more frequent deliveries. The total cost would be lower, even although the transport costs might be somewhat higher. Volvo Truck tried to hinder the change by threatening to leave Volvo Transport. However, it also took the opportunity to decide that it wanted a similar type of service for its supplies. In the end, Volvo Truck stayed on as a customer of Volvo Transport, but the conflict between Volvo Truck, VC and Volvo Transport remained.

The Dahl and LK agent example

Dahl is one of the dominating wholesalers in the building and construction industry in Sweden. The industry was deregulated a few years ago, which induced many changes for the firms in the industry. Dahl, which is a large wholesaler in ventilation, sewage

and heating systems, wanted to increase its competitiveness by reducing costs and reducing prices. One way to do this was to acquire one of its largest competitors in the Swedish market and to become a larger player with better bargaining power. The other way was by cutting out the import agents and to make direct contacts with the manufacturers. The existing supply chain was both too long and too loosely integrated.

Dahl started to cut out an agent, LK, for a very specific, very generic type of product and to concentrate purchases on one supplier of the product. As a result, the volumes got large enough for the supplier to establish itself in the Nordic market. The manufacturer adapted its routines and deliveries, which resulted in lower prices and reduced inventory of the products for Dahl. The contact between the supplier and the import agent, LK, was broken.

However, the agent LK was part of more than one supply chain of Dahl and was compensated by larger volumes of more advanced products such as floor heaters than the generic product that they lost. This provided a signal for their future development.

Sitting as an agent between two bigger firms, IK had to accept the situation. However, LK realized that Dahl was probably going to continue along the path of searching for more bargaining power and cutting out the agent's role in the supply chain. Therefore, it started to bypass the big wholesaler by making more direct contacts with other installation and building firms and moving over to selling systems rather than products.

Truck and airfreight services development – ASG (diverging case)

During 1960's and 1970's, ASG used traditional freight agents in Europe to provide both trucking, railway and airfreight services. Airfreight had only small volumes and was to a large extent seen as a side business. The supply chains for the airfreight and trucking services were very different in terms of activities and resources. The types of goods involved were different in size and value and the customer's expectations with regard to speed and reliability. Furthermore, the routines with the airlines and the international regulation of the air freight industry meant that the supply chain, in terms of resources and activities, was very different to that of trucking or rail. However, the distribution system of the freight forwarder, the local terminals and the competence of the personnel in terms of brokerage and freight forwarding were common.

When the volumes and distances grew for air freight, as well as the profitability, new types of goods were transferred to air freight. As customer's demands increased putting

pressure on distribution, existing routines and the handling of the air freight goods, the air freight business needed separate and more effective solutions, However, since the agents were not willing to create a totally separate supply chain, ASG could not meet customers expectations. Hence, in the early 1970's, a network of organisations was created where firms would give a higher priority to air freight, thereby creating an entirely separate supply chain with different personnel, activities and resources. However, this did not work out as well as expected, since agents in the different countries would have to split up existing groups of personnel, create new routines, invest in new systems, new offices at the airport, etc., which would, by necessity, increase their costs. ASG had to create a separate collection and delivery service to and from airports, its own offices at the airports, and recruit new specialised managers from the airline industry.

In the end, a new network consisting of specialists in air freight was established based on larger firms having separated the air freight business or established totally new firms in the field. This network took over in growth and development of the service and the old one gradually disappeared.

The integration of the air freight business necessitated a decrease in the overlap between the service delivery systems of land and air transportation. Existing agents tried to hinder the development as long as possible, seeing the extra costs involved in separating the two supply chain networks. Some of them lost out totally and became no longer part of the growing air freight network, while other agents took the chance for future development.

RESULTS

Our intention was to study the effects of integration on the overlapping supply chain and the constraints and opportunities on the integration of the overlap.

We analyse the illustrations from different perspectives. Firstly, we discuss what types of effects the integration process of the focal SCN really had on the overlapping SCN in terms of actors, activities and resources. Then we discuss the role of the total firm network on the overlapping effects. Next we study to what extent the effects differ with the three different alternative ways of integrating the supply chain networks. Finally, we

discuss the possible constraints and opportunities resulting from the integration process, which reflects the reactions of the overlapping chain.

Effects were present on actors, activities and resources.

What were the typical effects from overlap on integration process in the cases?

In the Volvo case, the overlap was seen on all three levels of actors, activities and resources. Three actors (Volvo Transport, Volvo Truck and the external transport firm) were part of both supply chains. Volvo Transport and the external transport firm, were willing to integrate the supply chain of VC, Volvo Truck, but, on the other hand, reacted strongly against the integration. The goods from both supply chains were consolidated and deliveries coordinated before the change. In the new solution, the milk-runs split the resources and changed established activities. Important effects were new routines and fewer economies of scale and scope for existing resources of the external transport firm, Volvo Transport and Volvo Truck. New resources, new activities and fewer actors became necessary in the new system. Volvo Truck could expect the largest negative effects.

In the Dahl case, LK was cut out of the supply chain and direct contact was established with the supplier. The new deal with the supplier meant larger volumes in the focal supply chain network and fewer suppliers involved.

In the case of service supply chain networks, the transport firm is an example of how firms first use overlaps between supply chains in order to get a better economy and a good start in a new business. Some of the basic know how was common for trucking and air freight services in the early stages of the service development. Also, resources in terms of terminals, trucks and personnel, could be used for both supply chains. The same situation was present in terms of activities. However, over time, as specialisation increased and the supply chains had to diverge, the actors had to invest in new terminals, offices and competencies in order to be competitive and adapt to the development. Otherwise the relationship would, at least in the long run, have to break.

In all three cases, the inertia in existing relationships was strong as the relationships did not break, in spite of threats to leave from actors of overlapping supply chains. Such was totally in line with what we and Håkansson and Snehota (1995) expected. On the other hand, in the long-run, the relationship actually broke when the actors intentionally hindered development by not adapting. In many cases, the actors actually continued

with the trucking services only, leaving the air freight field out. In this case, the firm continued to be part of the total network (Mattsson, 1987; Hertz, 2001).

In the Dahl and LK case, the relationship also continued within the total network, even though it ceased in the first supply chain. Therefore, the total network of the firm was found to be very important (Hertz, 2000).

Does the effects on overlapping SCN differ depending on type of integration?

In this part, we want to show how the different ways of integrating a supply chain network influence the overlap. Does it differ for the effects on the overlapping SCN if the focal chain is narrowed, shortened, or if the relationship gets closer, or if its widened, extended and becomes looser?

In general, it seems that increasing integration in the form of narrowing, cutting and closer relationships in the focal supply chain network caused decreasing integration between the chains. Therefore the overlap decreased as a result.

As a part of the narrowing process in the Volvo case, dedicated logistics systems were created. These systems closed out an overlap with Volvo Truck, which meant changing the activities and creating new resources. There was a trade-off in terms of lower economies of scale or scope, as the volumes of Volvo Trucks were taken out of the logistics system and the dedicated milk-runs for VC created. Even though the costs of transportation were to increase for VC, the advantages of higher frequency, more adapted deliveries and better reliability were more important.

On the other hand, cutting out the agent in the Dahl-LK case, LK had to leave the existing supply chain network. Because of this, the former overlap between the supply chains disappeared. The effects were large in the focal supply chain network but of minor importance for the overlapping one. The structure in the overlapping chain was still the same, but the closeness of the relationships between Dahl and LK increased due to the increased volumes.

The third alternative of closer cooperation combined with narrowing alternatives is illustrated by the air freight-trucking case. To begin with, if the integration was made only at an activity and resource level and the actors were the same, then only a few of the activities and resources needed to change. The actors had the possibility to continue and still be overlapping, but the activities and resource overlap would have to be heavily reduced. The next step, however, involved a much higher degree of integration of air

freight, demanding an almost total separation of the supply chains. At this stage, the effects really started to show, since they were narrowing the air freight chain by limiting the supply chain network only to air freight suppliers and agents. The effects were that new firms developed and new networks were created for those who had separated their air freight service. The effects of closer relationships within the air freight supply chain network did not work as many of the firms preferred to be part of the trucking service supply chain network only and did not want to make the increased investments.

A total break of two chains on the activity and resource level was a difficult step to take.

It seems that the effects of closer cooperation involving new investments were even larger in the cases of narrowing or shortening the supply chain. Both closer cooperation and narrowing had large effects within the chains, but also on the overlapping chains. It was a question of priorities and conflicts between the supply chain networks.

In the second case, LK was cut out. It was not a question of prioritizing, but rather getting rid of some activities and the actor. The influence on the overlapping chain was reduced. A slight change of increased importance in the overlapping chain as compensation for the loss was visible.

The more overlapping the supply chains, the larger the effects of increasing integration caused decreased integration in the overlapping chain. Shortening the chain does not necessarily have large effects on the overlapping chain. However, this will depend on the degree of compensation made for the loss in the focal supply chain network. Narrowing the chain means fewer firms involved at each stage, which in our illustration meant having fewer firms involved with Volvo Truck.

It seems that the most important parts are that the other chain needed to invest more or get lower service or higher costs as a result. Often there will be the possibility of achieving larger scale economies. On the other hand, a decreased overlap, as in the air freight case, the firm saw that new investments were needed in order to integrate the air freight supply chain.

The constrains and opportunities on the integration process of focal SCN

In the Volvo case, the overlap resulted in constraints on the focal integration process as a result of complaining and trying to influence the solution, while in the air freight and truck case, it could actually delay the total development of air freight.

In the air freight case, new solutions became very difficult to develop as a result of the overlap with trucking services. New resources and new relationships had to be created, as well as the establishment of new routines and knowledge. As with Dahl and LK, the changes in overlap were minor, but it became a trigger for a new strategy for LK. The constraints on the focal chain were mainly a delay in the decrease in overlap by negotiating compensation in the overlapping chain and also about the agreement with the supplier. In the end, the supplier took over.

However, in all three cases, we found that the cost of change met greater resistance by the firms in the overlapping chains. An integration of change in activities and resources may cause large problems for actors. Changing an actor, however, seems to influence the strategy and lead to new strategic changes by either cutting out or joining an additional actor in the chain. The long-run effects and opportunities might be large when a change of actor is involved, but in the short run, a change of activities and resources might have large effects on the other chains. In the cases of shortening or narrowing the focal supply chain, leading to actors/firms being cut out or turned into secondary suppliers, the restraints from the overlapping supply chains seem to be smaller than when they stay on a lower level.

When we have an increase in the degree of overlap in activities and resources, but with the same actor, then the constraints might be of the kind that a larger investment in more resources is needed. Opportunities for the overlapping supply chains, actors, resources and activities were present in all cases when the actor cut out was compensated in the other chain, or if the integration in the first chain caused an increased integration in the overlapping chain.

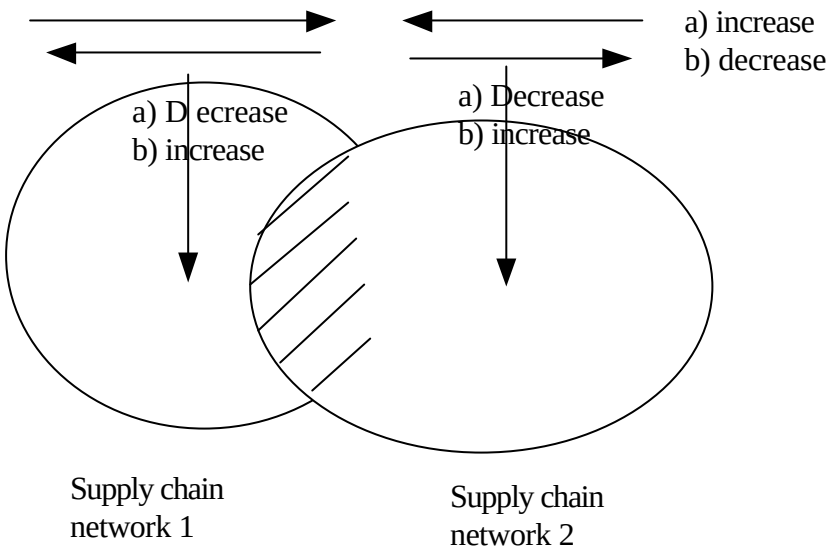
There is actually a trade-off between the costs of integration in the first chain and the increasing costs of decreased integration in the second chain, which is seldom taken into account. However, sometimes it is necessary for economic reasons, to turn around a specific business like VC. The other supply chains have to find their own solutions when such a situation is present (Figure 3).

CONCLUSION

The purpose of this paper was to discuss the effects on integration of one supply chain caused by the overlap of another supply chain.

Figure 3

Overlapping supply chain networks



As we have seen, the overlap of supply chains show that there are important trade-offs between integration within and integration between supply chain networks. Increased integration within one supply chain seems to decrease integration between the chains. The vertical integration in one supply chain causes the reverse effect horizontally and the other way around. Furthermore, the resistance to change in the overlapping chain might increase the costs and delay the change.

Therefore, how we define and organise business units and set up supply chains is very important. Competition in the market plays an important role for the demands on the efficiency and effectiveness of supply chains. Hence, it is often pushing supply chain networks to increase integration.

There are positive and negative aspects of overlap, but what we understand, is that overlap is a positive factor during a certain stage for new business. Overlap makes it possible to co-use resources and coordinate activities with other products or services. When the same resources and activities are used for a new product or service, the costs can be reduced and knowledge transferred. New supply chains have to be developed and modified as a result of changes in customer demands, and, as the technology

changes over time, specialisation may be necessary and the overlap decrease. Then the overlap may create negative effects.

Furthermore, changes in the way we want to market products, seems to be reflected in the integration of the supply chain network as well. An increasing customer orientation and seeking to find new ways of serving specific customer segments gives rise to the development of new supply chains. However, combining agents, sales or operations gives the new supply chain and business a chance to develop gradually before breaking the service delivery chain from the other.

We know that increased integration is in many cases, vital for the development and competitive advantage of firms in the supply chain. However, in many cases, it seems necessary to reflect upon how the division between supply chains is made, which was shown in the cases and upon the creation of new supply chains.

As we see it, constraints occur at all levels. The organisation dominating the other supply chain might try to hinder the integration of the other chain by threatening to leave, or at the same time, demand a similar integration process for them.

In other cases, as in the air freight case, if firms react by refusing to change after a certain level, then it might become necessary to create new firms or choose a new firm for that specific air freight service delivery.

We know that a decrease in overlap might cause increased costs arising from the need to create new competences and make new investments. Therefore, it also seems logical that firms hesitate to take the move unless it seems necessary. Only a few take the opportunity. Taking the opportunity seems to be on a more strategic level than creating constraints. Constraints are seen on all levels, yet the possibilities to influence are different depending on the power of the firms being part of the overlapping chains.

REFERENCES

Abrahamsson, M and S. Brege (1997), "Structural Changes in the Supply Chain". *The International Journal of Logistics Management*, Vol.8, No 1, pp 35-44

Anderson D. and H. Lee (2000), *Synchronized Supply Chains: The New Frontier*.www.ascet.com

Christopher, M. (1998) *Logistics and Supply Chain Mangement - Strategies for Reducing Cost and Improving Services*. London, U.K. Financial Times/ Pitman Pbl.

Christopher,M. (2000) *Creating the Agile Supply Chain.* www.ascet.com

Claycomb, C., C. Droge and R. Germain (1999), "The Effects of Just-In-Time with Customers on Organisational Design and Performance", *International Journal of Logistics Management*, Vol 10, No 1, pp.37-58

Council of Logistics Management (1995), *World Class Logistics - The Challenges of Mangement of Continuous Change.* Global Logistics Research Team, Michigan State University

Coyle, J.J., E.J. Bardi and C.J. Langley Jr (1996). *The Management of Business Logistics.* St. Paul, MN, West Publ. Comp.

Davies,G.(1996). "Supply Chain Relationships", in F. Buttle (ed): *Relationship Marketing- Theory and Practice*. London; Chapman

Dwyer, F.R., P.H. Schurr and S. Oh, (1987). "Developing Buyer-Seller Relationships". *Journal of Marketing* Vol. 51, pp. 11-27.

Easton, G. (1992). "Why Networks?" in Axelsson, B and G. Easton (eds), *" Industrial Networks - A New View of Reality"*. London; Routledge.

Ford, D, L.-E. Gadde, H. Håkansson, A. Lundgren, I. Snehota, P. Turnbull, D. Wilson (1998). *Managing Business Relationships.* London, U.K., Wiley & Sons

Gadde, L-E. and L-G. Mattsson, (1987). "Stability and Change in Network Relationships", *International Journal of Research in Marketing*, 4, pp. 29-41.

Gomes-Casseres, B. (1998). *The Alliance Revolution - The New Shape of Business Rivalry*. Cambridge. Harvard University Press

Gulati, R. (1998) "Alliances and Networks" *Strategic Management Journal*, Vol 19, pp 293-317

Harland, C. (1999) "Social Network Strategy and Social Capital." in: Leenders, R.T, A.J. Gabbey and M. Shaul *Corporate Social Capital and Liability*, Boston; Kluwer Acdemic

Harland, C.M., R. C. Lamming, J. Sheng and T. E. Johnsen (2001) "A taxonomy of Supply Networks" *The Journal of Supply Chain Management*, Vol 37 No 4, pp 21-27

Hertz, S. (1993). *The Internationalization Processes of Freight Transport Companies - Towards a Dynamic Network Model of Internationalization*. Stockholm: EFI at the Stockholm School of Economics (Dissertation)

Hertz,S., J. K. Johansson and de Jager (2001), Customer Oriented Cost Cutting: Process Management at Volvo in *Journal of Supply Chain Management*, Vol.6 No 3 (forthcoming)

Hertz, S. (1996), "The Dynamics of International Strategic Alliances - A Study of Freight Transport Companies." *International Studies of Management and Organisation, Vol. 26, No 2, pp. 104-130*

Hertz, S. (1998), Domino Effects in International Networks. *Journal of Business to Business Marketing, Vol.5 No 3, pp. 3-31*

Håkansson, H., (1982). *International Marketing and Purchasing of Industrial Goods: An Interaction Approach.* Chichester; J Wiley.

Håkansson, H. and I. Snehota (1995) *Developing Relationships in Business Networks.* London: Routledge

Johanson, J. & L-G. Mattsson, (1988). "Interorganizational Relations in Industrial Systems - A Network Approach". in Hood, N. and J-E Vahlne (eds), *Strategies in Global Competition.* New Hampshire; Croom Helm, pp 287-314.

Kaplan. M. (2000) Evolution of Business Models - The Case of Dell and Compaq of Sweden (working paper)

Kyle, P., H. Singh and H. Perlmutter (2000) "Learning and Protection of Proprietary Assets in Strategic Alliances: Building Relational Capital". *Strategic Management Journal*, 21: 217-237

Liljegren, G., (1988). *Interdependens och dynamik i långsiktiga kundrelationer- Industriell försäljning i nätverksperspektiv*. Stockholm; EFI/ MTC.

Ludvigsen, J. (2001), *The International Networking between Logistical Operators.* Stockholm, The Economic Institute at Stockholm School of Economics (Doctoral Dissertation)

Lundgren, A. (1995) *Technological Innovation and Network Evolution*. London; Routledge

Mattsson, L-G. (1987), " Managing of Strategic Change in Markets as Networks Perspective", in A. Pettigrew (ed), *Management of Strategic Change*. London; Basil & Blackwell.

Omae, K. (1989) "The Global Logic of Strategic Alliances". *Harvard Business Review* March-April, 1989

Peck, H.,A. Payne, M. Christopher and M. Clark (1999), *Relationship Marketing- Strategy and Implementation*. Oxford, Butterworth & Heinemann

Sweet, Susanne (2000), *Industrial Change towards Environmental Sustainability - The Case of Replacing Chlorofluorocarbons.* Stockholm School of Economics, EFI Publ. (Doctoral dissertation)

Towill, D.R. and P. Mc Cullen (1999) "The Impact of Agile Manufacturing on Supply Chain Dynamics". *The international Journal of Logistics Management*, Vol 10 No 1 pp 83-96

Whipple, J. and R. Frankel (2000),"Strategic Alliance Success Factors". *The Journal of Supply Chain Management*, Summer ,pp. 21-28