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REP98

Domino Effects in International Networks

Susanne Hertz

ABSTRACT. The two basic characteristics of the industrial network approach are firstly, that actors and individual relationships between actors are embedded in a network context and secondly, that important driving forces for change are endogenous. In this paper we consider these two basic characteristics, as we develop the "domino effects" concept to describe and analyze how changes in one relationship explain sequential, consecutive changes in other relationships. Domino effects are more likely to develop where a higher degree of integration and complexity in the network exist. The effects are transferred via indirect relationships. The need to defend existing markets and the importance of getting the timing right when seeking new representatives are both factors which add impetus to structural changes in the industry. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: getinfo@haworthpressinc.com]

A German firm, Uniontransport, is acquired by a Dutch firm, Nedlloyd. A few months later the Dutch firm, Scansped, abandons its agent, Panalpina, in Germany. Two seemingly isolated changes.

As it turns out, the same firm Nedlloyd was the Dutch agent to Panalpina in Germany which broke the relationship to Nedlloyd as a result of the acquisition and started its own activities in Holland. This caused the relationship between Panalpina in Germany and Scansped in Holland to break.

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This gives an example of "domino effects." How can the domino effects be understood and what does their existence mean to the firms in the network?

These are the questions discussed in this paper.

Underlying the example of domino effects given, there is a network of interdependent and related firms which are subject to ongoing changes. Some of these relationships and changes are known to the individual firm but others are not so apparent.

As firms internationalize in increasing numbers, international interdependencies increase. When a change occurs these interdependencies induce a number of positive and negative effects upon organizations throughout the network.

In such a situation an organization does not necessarily have to be directly involved in the change that triggered such "domino effects" in order to be seriously affected. The impact might arise through indirect relationships. It follows therefore that in large international networks indirect relationships become critical to development. However, changes in indirect relationships are neither clearly visible to a company nor easy to interpret in terms of possible effects on the organization. Since companies often lack the knowledge of when and how these effects will spread in the network, most effects will be unexpected and reactions difficult to plan. Possession of such knowledge would help in understanding and handling changes in industrial structures. This makes it of vital interest to clarify the phenomenon of domino effects and its expected occurrence.

More specifically, our purpose is to study under what conditions "domino effects" occur and how they develop and some implications for the organizations involved.

The contribution of the paper is mainly theoretical. We start by presenting a conceptual framework for the understanding and interpretation of domino effects. This mainly includes the network approach and internationalization in networks. The focus here is on finding basic factors for the existence of domino effects, both of the contextual setting and of changes. Based on these theories and factors the case studies are then analyzed and the phenomenon of domino effects is derived and developed in the specific cases.

Case studies from European goods transport firms are used to illustrate the change pattern and "domino effects".

their occurrence, how and why they develop and we will then formulate six theoretical propositions. Before concluding the paper, we will present some of the managerial implications stemming from domino effects.

CONCEPTUAL FRAMEWORK

In order to understand domino effects, we need to find out about networks being the context in which they take place and to define the phenomenon in such a context. Based on this, we look at the triggers and the development of domino effects, by discussing changes in the degree of integration in relationships and nets and in international networks. Then we discuss the implications of these changes in terms of complementarity and conflicts by making use of the concepts of positive and negative connectedness and overlapping and complementary nets. These concepts are then the basics around which the paper is constructed.

Relationships, Nets and Networks

In general terms, a network is a set of connected exchange relationships (Johanson & Mattsson 1992). In a network the exchange relationships are defined as connected if exchange in one relation is contingent upon exchange in the other relation (Cook 1982 p. 180). Therefore, direct and indirect relationships are fundamental to understand network interconnectedness.

Since the focus here is on industrial networks, the exchange is assumed to include an industrial activity and that it takes place in the relationship between interacting organizations (Easton 1992).

An industrial network of organizations might be analyzed at four different levels, i.e., the single organization, the relationship, the net and the total network.

The *net* is seen as a sub-network in the total network of the industry showing a higher degree of interdependence (Easton *ibid*). It is used to distinguish limited interrelated actors who control and coordinate the resources of interconnected production systems (Johanson & Mattsson 1992). The limits of nets and networks are arbitrarily determined by

Through *exchange relationships*, organizations develop and their interdependencies evolve. Changes of single dyadic relationships will be seen as changes on a *micro* level while changes of nets are on a *meso* level and of network on a *macro* level.

The concepts of relationships, nets and network and how they are related form the basis for our theoretical discussions.

Domino Effects

"Domino effects" in a network are interpreted in this paper as successive changes in relationships and nets and have effects on the positions of organizations in a net as well as on the total network of an industry.

In the game of dominos the matching between pieces, "bones" or "dominos," is dependent on the initial change of position of the game and continues to change in a dyadic sense until there are no more pieces to match.¹ The game has been used as a metaphor in politics² for a situation where interdependency is high and a change of one setting will cause a number of other changes. Even more relevant in this case is the concept of domino effects used in the children's game of "dominos" in the sense that a row of connected dominos fall at an accelerating speed due to the fall of the first one. In all three definitions connectedness, speed and sequence of changes are seen as basic elements of domino effects. *Sequences of changes* are the process, *connectedness* is a prerequisite and *speed* a contributing factor to the development. These three are triggered by the *initial change*.

One area of research that touches upon the phenomenon of domino effects and organizational change is ecology (Paine 1966, Astley 1985). Astley (ibid) argued that "domino effects" can take place when complex and highly integrated communities experience disturbances above a threshold level. Then the community, seen as a network of interorganizational relationships, may even disintegrate because of "domino effects." Similarly Loucks (1970) has observed that a succession of changes produces periodic waves with episodes of instability interjected with extended states of equilibrium. The three basic elements of sequences, connectedness and speed are present in the words "succession," "integration" and "waves."

The "domino effects" in a network of interconnected organizations could thus be regarded as a change (i.e., establishment or breaking) of a relationship, triggering a sequence of changes in other relationships

within a relatively short period of time. Following the reasoning of Astley (1985) and Loucks (1970) we should also add that a high degree of complexity and integration would be a prerequisite for domino effects.

Integration in Relationships and Nets

Integration is defined as a process of combining separate parts into a whole and is seen as an ongoing process and state of change that could be analyzed from different interacting aspects such as institutional form, execution integration and coordination of decisions (Mattsson 1969 p. 37). Further, Stinchcombe and Heimer (1985 p. 70) argue that integration is necessary when there is a quick series of highly interdependent activities between organizations like in inter-related production systems. In this paper the process of integration takes place in relationships and nets of industrial networks where the interdependencies between activities and interrelatedness between production systems are important basic conditions.

However, integration changes over time. Relationships, nets and networks go through lifecycle patterns over time, starting with periods of increasing integration and then of decreasing integration (Dwyer, Schurr and Oh 1987, Gadde & Mattsson 1987, Hertz 1996, Liljegren 1988). These stages of increasing integration for relationships and nets have been labelled "establishment of relationship" or "joining of nets," "closer cooperation" within relationships and nets, expansion or "enlargement" of the relationship or "closing up" the net. For decreasing integration, the terms "looser cooperation" and "dissolution" or "splitting of nets" have been applied (Hertz 1996).

Relationship changes are the base for changes both in nets and networks. Gadde and Mattsson (1987) argued that not only direct but also indirect relationships have to be taken into account in order to understand changes ongoing within the relationship. This interdependence between direct and indirect relationships stresses the importance to include changes within a larger context, i.e., net and network levels

International Integration in the Internationalization Process

Over time as companies have internationalized, international connectedness and international competition have increased and the mar-

kets have become more international. After going through periods of *extension* (geographical spread) and *penetration* (the amount of resources and relations) within countries, *international integration* (coordination between countries) has become increasingly important for firms and industries (Johanson & Mattsson 1988). Thereby an increasing number of companies are part of more integrated international nets and "joining of nets" (Hertz 1993) becomes a normal practice. This is in contrast to the traditional internationalization approach, i.e., the gradual increasing commitment in foreign markets over time, a change of international growth approach argued by the Uppsala School (Johanson & Vahlne 1977).

Thus moving in and out of nets, i.e., joining or splitting of nets, becomes a normal behaviour pattern. This implies that the lifecycles of relationships and nets also become applicable to analyses of internationalization processes.

An illustration of this is the fact that the studies in international business have shown an increasing interest during the last decades in the importance and advantages of more integrated MNE international networks where acquisitions, mergers and strategic alliances are the different means to acquire such integration (e.g., Chandler 1990, Dunning 1977, Kogut 1983, Magee 1977, Martinez & Jarillo 1987).

This increasing integration of the international networks leads to a higher complexity and larger network effects, including domino effects.

Positive/Negative Connectedness and Complementary/Overlapping Nets

We know from many studies, however, that investments in relationships are long term and that well established relationships are not easily broken (e.g., Ford 1978, Håkansson & Östberg 1975, Gadde & Mattsson 1987). Consequently, the organizations must have very strong motives, such as decreasing effectiveness or risk for future development, to break their existing commitments and especially for doing so within a short time period. Even though cooperation and complementarity dominate within relationships, conflicts and competition exist in parallel, contributing to relationship dynamics (Håkansson 1987, Liljegren 1988).

This might change over time, as companies develop and take on new

a net. In cases when such change concerns closely related organizations or related organizations, affecting their positions in the network, this would trigger the organizations to find substitutes. The existing relationship would then be substituted by another for both firms. This can be described as a shift from being positively to negatively connected³ at relationship level and from being complementary to overlapping at net level⁴ (Cook 1982, Hertz 1993). Furthermore, if the change takes place at short notice due to an acquisition, merger or strategic alliance, a speedy reaction is vital. Therefore the concepts of positive and negative connectedness and complementary and overlapping nets not only add to the motivation of asking why companies dissolve or split nets but also to the understanding of the need for speed.

We summarize by giving a simple example of domino effects where companies are substituting existing negatively connected relationships with positively connected (see Figure 1). The initial change is assumed to be a newly established relationship between firm A and B which are negatively connected to the relationship between B and C. From there the changes go on.

However, as international integration has developed over time, the sequential changes show a larger complexity including both different countries, larger number of changes and larger effects of the indirect relationships changes. As discussed, complexity and integration are seen as important prerequisites for domino effects.

The sequences of changes show endings and beginnings of life-cycles of changes. The effects would include an important element of time and speed causing changes as the result of the expected effects on the focal company's position.

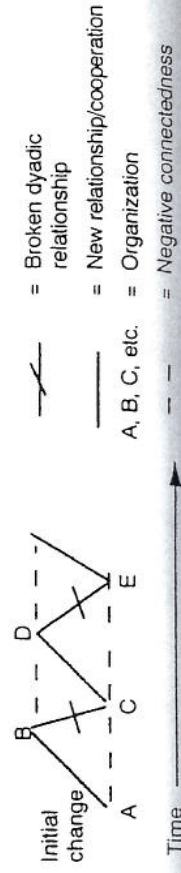


FIGURE 1. Domino Effects--Simple Dyadic Sequence of Changes

This theoretical framework will be used to detect the existence of and to develop an understanding of domino effects in the empirical study.

THE EMPIRICAL STUDY

A study of domino effects would necessitate following a chain of changes and reactions between organizations. A suitable way to follow this dynamic phenomenon would be to follow a specific case over time.

The two domino cases are included in three larger longitudinal case studies of the internationalization processes of three focal transport companies and their international nets, namely, InterForward, Bilspedition and ASG. All three are based in Scandinavia and are to a large extent competitors. The cases span periods of about 3, 35 and almost 50 years respectively. The youngest of the groups, InterForward, was established in 1988 and went directly into international business through one large acquisition, followed by the acquisition of more than 20 medium sized companies and around 50 smaller ones within 3 years. ASG went international already during the second world war while Bilspedition commenced its international activities in the mid-1950s (Hertz 1993).

In 1990, ASG had sales of SEK 5,4 billion, Bilspedition SEK 15,4 billion and the newly established InterForward SEK 5,6 billion. All three ranked among the largest transport and forwarding groups in Europe.

Thirty-six interviews with key informants were conducted in the five countries involved and extensive secondary material such as protocols, memos, annual reports, company sales and marketing material, etc., were studied. The three large groups of cooperating companies were all in the same industry, embedded in the same context and competing in the same markets in Europe.

In order to achieve internal, construct and external validity (Yin 1989) we have used multiple sources and crosschecking. All key informants were asked not only about the development of their own businesses but also about changes taking place on the market and specifically concerning the other groups studied. The informants in the case companies have had the possibility of reading and correcting what has been written. External sources such as newspapers, cargo

magazines, etc., were followed during the period but were only used as supporting material in a general sense. Furthermore, the author, through long experience in the industry, is very well informed about the organizations concerned, the business and its industrial logic. Such experience influences the possibility to understand how to create both construct and external validity. Where it concerns reliability, the possession of a deep understanding of the business makes the interpretation of the changes going on that much easier.

Included in the large case studies are specific studies of 11 events, specifically chosen from the cases in order to show a more detailed dynamic picture of the large number of changes going on and their interaction with and effects on other organizations and nets. Study of these specific events revealed the presence of domino effects. Thus the domino effects were discovered in the research process and not proposed at the outset.

The study of Hertz (1993) showed that over time most customers, agents, competitors and suppliers of these groups became internationalized. At first there was an intensive period of increased European extension of their international networks, after which changes in extension in Europe were only marginal. Instead, the issue became one of penetration as business grew, mainly together with existing agents but sometimes through greenfield investments or acquisitions, mostly of agents. At the end of the 1970s integration of nets became an important issue as conflicts started to appear between international nets of agents in different countries and the first changes related to domino effects became visible.

Change of international representatives was often well known, not only to the companies directly involved but also to many other groups in the industry since international representation is vital for the competitive advantage of transport and freight forwarding companies. Transport companies and their international representatives normally have a mutual representation and are therefore extremely interdependent in their relationships, transport systems and networks. One important difference compared to a traditional manufacturing company is that transport companies should have all functions, including operations, available in the foreign country in order to perform their services.

High interdependence makes transport companies in particular and

the transport industry in general suitable for studying network changes, since reactions are quick and effects visible.

CASE STUDIES OF DOMINO EFFECTS

Two case studies from the larger longitudinal study have been selected to illustrate the phenomenon of domino effects. The first is the Bilspedition merger case. The second illustration is the Nedlloyd and Tekatrans case. Both changes concern large groups of companies of importance to the industry and are focusing on changes in Europe. Further they took place during the late 1980s which was a turbulent period for the freight forwarding industry with many acquisitions as a result of a positive financial situation and expected EU integration and deregulation.

Both cases show an actual chain of changes and events, and include a number of changes in relationships and nets.

Bilspedition Merger in Europe

The changes which are studied in the Bilspedition merger case result from the merger of Scansped (Skandia/Fallénius/TK), Wilson and ATA international transport groups. The events presented here only cover a part of the European situation. The case focuses on three different changes: the large merger of the three parent companies in Sweden, the merger of the subsidiaries in Europe and the effects of this in Europe and particularly on the Swedish market.

Bilspedition had acquired two of the largest Swedish international transport groups, Wilson (1982/83) and Scansped (1985/86), both overlapping in their activities and geographical coverage with the existing international activities of the Bilspedition subsidiary ATA as well as with each other. The acquisition of Scansped was a hostile takeover. After several discussions the largest of the Scansped group companies, NTS, left the Scansped group before the final takeover and became the nucleus of a new competing group, InterForward. Bilspedition acquired the other companies left in the Scansped group, i.e., SkandiaTransport, Fallénius & Leffler and TK.

that they should continue as separate groups. However, this created economic problems for Bilspedition. Not only did the Swedish parent companies compete but the three groups combined had 24 fully owned subsidiaries in different countries and well over 200 agents in Europe, many of whom also competed with each other.

The economic situation made Bilspedition decide to merge the three groups of international transport and forwarding companies in 1988, starting with the parent companies in Sweden. Before the change, the three groups covered Europe more or less extensively through their 17, 51 and 58 agents and wholly or partly owned subsidiaries. The new constellation was to be called Scansped.

The merger of the three parent companies resulted in severing the connections with 56 of the existing agents and giving priority to their own subsidiaries and to 43 selected agents. This meant closer cooperation in the remaining relationships, increasing the level of integration in the new net.

Reorganization took place within the parent organizations and the implementation of that took at least a year. Total volumes decreased by roughly 8-10% since many customers stayed with the former agents. This was the result in spite of market growth during that period.

The international organization that remained, whether a subsidiary or an agent, had to take on the volumes of the former three Swedish parent organizations. This caused capacity problems and increased the frequency of the transports. Basically, the vast majority of the agents left out became competitors to the new Scansped in land transportation in Europe. Only in one specific case, that of Finland, did the agent take the initiative in leaving which forced Bilspedition to find a new Finnish agent.

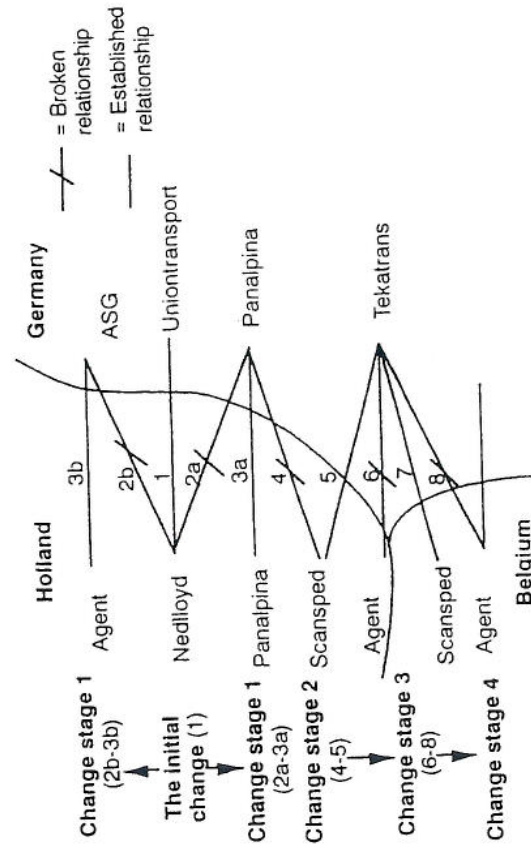
The effects of the merger between the three large groups on the Swedish market were significant. The agents that were asked to leave had to find another representative practically overnight. Some of the more attractive European agents were able to find suitable alternatives especially in cases where there was a Swedish company dissatisfied with its existing agents. In this way two of the largest competitors in Sweden, ERT of the ASG group and NTS of the IF group, gained the opportunity to switch agents in geographical areas such as Germany, Switzerland, Austria, and Finland. Since there were only a

Scansped acquired Tekatrans is a result of many other different events starting with Nedlloyd acquiring Uniontransport.

Nedlloyd, a large Dutch international transport group and one of the larger transport and forwarding companies in Europe, originally cooperated with several agents in Germany. In 1988 it acquired Uniontransport in Germany, a large German company with good coverage of the country (see Figure 2). Nedlloyd therefore ceased its cooperation with its German representative Panalpina (another large international group) in Stuttgart (2a). As a result, Panalpina, which in turn was agent to Scansped Holland in the Stuttgart area, got its own activities in Holland (3a) and in doing so ceased its cooperation with Scansped Holland (4).

As a result, Scansped Holland had to find another suitable representative in the Stuttgart area. Scansped's own subsidiary in Stuttgart lacked the necessary resources, however, and none of the existing Scansped agents in Germany were willing to solve the problem. Scansped's international expansion caused large parts of the nets of the international agents and the Scansped net to increasingly compete. Scansped resolved the situation by acquiring Tekatrans (5), an interna-

FIGURE 2. Nedlloyd and Tekatrans



entered the market. Many of them included former personnel from the merged companies earlier committed to the activities of specific European areas, where the agents of the new company were representatives. Some of the former agents acquired a part of Swedish transport companies like Danzas which acquired half of Rationell Transport. Danzas lost its Scandinavian representation for several of its European subsidiaries. In the case of Danzas the relationship with one of the merged companies had lasted around 40 years before it was now broken.

In eight different European countries the new merged Scansped group had two or more international subsidiaries competing. This caused cooperation difficulties for the newly merged parent. Therefore Bilspedition decided to merge the competing subsidiaries as well. The subsidiaries were to give priority to cooperation with sister companies. The process started a couple of months after the parent merger. Within a year 20 subsidiaries in eight countries were merged into 9. In total the number of subsidiaries had been reduced from 24 to 14. All were to use Scansped companies as representatives. As a result of this the same changes were repeated for the subsidiaries as for the parent companies, only the resources involved were more limited. The merged subsidiaries, however, not only had to manage their own merger as well as the change brought about by many international representatives leaving, but also had to adapt to the situation whereby their new representatives were the outcome of the mergers of all sister companies at the same time. On top of this, they also had to handle much greater volumes from the newly merged parent, and the fact that their former agents became new competitors. The subsidiaries dissolved in total around 100 relationships to agents/representatives.

The new net of representatives was not really settled at the end of 1989, further changes were going on as a result of a new large acquisition by Bilspedition in Finland in 1990. Therefore the process of change had to go on and the effects on the total network continued.

Nedlloyd and Tekatrans

The case shows some of the effects that Nedlloyd group's acquisition of a large international transport company, Uniontransport in West Germany, had on different nets of transport companies and especially on Scansped's acquisition of Tekatrans in Stuttgart. The event that

tional transport company with strong traffics to/from Holland and Belgium. In turn, Tekatrans had to break with its agents both in Holland and in Belgium (6 and 7) and its sales force moved into the office of Scansped in Belgium (8). From there the chain probably continues on (see Figure 2).

The Nedlloyd acquisition of Uniontransport also had effects on ASG since ASG was cooperating with another company acquired by Nedlloyd, van Gend & Loos (vGL). vGL had been an agent of ASG's since the 1950s and cooperated also with ASG Hamburg. Due to Nedlloyd's acquisition of Uniontransport, ASG Hamburg lost its Dutch agent vGL (2b) but found a new agent which was part of the Belgian Ziegler Group (3b).

Case Analysis

The changes in these cases involve joining and splitting of nets due to acquisition, mergers, alliances, etc., triggering many sequences of changes. The two cases are divided into different change stages in order to show change sequences more clearly and to understand the development of domino effects.

Bilspedition Case-in Europe

The initial change: Three separate competing nets-ATA, Scansped, and Wilson-were joined into one net. All three groups were fully owned by Bilspedition. Relationships to 56 agents were broken. Cooperation continued with 43 agents and 24 subsidiaries.

Change stage 1: The former agents from different European countries were looking for new agents in Sweden.

At the same time 20 subsidiaries in eight countries were merged into 9 companies. Relationships to about 100 agents to the subsidiaries were broken.

Change stage 2: New Swedish relationships were established by most of the ex-agents. Two of these were ERT (a group owned by ASG) and NITE (a group owned by InterForward), who took the

tions also entered the field. Some had been active earlier in transportation while others were new to the field. Many of them were established by former managers from the merged groups.

The ex-agents of the Scansped subsidiaries were at the same time looking for new agents in the European countries involved.

Change stage 3: The former agents of the subsidiaries established new relationships with other agents or sister companies.

Change stage 4: Continued restructuring . . .

The changes that took place at net level seem to have determined changes at the relationship level of the Scansped net, as well as leading to changes in relations connected to other nets. In some cases relationships were dissolved in spite of a long term good cooperation, due to the development of negatively connected relationships or overlapping nets.

The degree of integration increased for the total Scansped net. Both the remaining agents and the subsidiaries were cooperating closer to the parents as well as to each other. The merged business was also much larger in volume than each of the former groups. The increasing integration was in some cases made at the cost of a decreased penetration, since relationships to a large number of agents, covering larger areas, a wider range of activities and more customer relationships, were dissolved. In many cases the group was forced to make further investments in terminals and new relationships as well as in buying new companies.

The effects on the markets were big in those geographical areas where the former subsidiaries and agents had been large international companies. In other countries or areas the effects were limited to that of transportation to/from Scandinavian countries, since the new merged Scansped was extremely strong in Scandinavia and many competing newly established relationships were marketing their new services. Competition for Scansped was intensified both in Sweden and in many European countries as their old partners turned into competitors.

In the Nedlloyd-Tekatrans case the sequences of changes are divided into the initial change and 4 change stages out of which the first

Nedlloyd-Tekatrans

The initial change: The Nedlloyd and Uniontransport groups were joined through the Nedlloyd acquisition of Uniontransport (a large German group).

Change stage 1: Relationship to Panalpina, agent to Nedlloyd in the Stuttgart area, and the relationship to ASG, agent to Nedlloyd in the Hamburg area, were dissolved.

New relationships were established for Panalpina and ASG in Holland. Panalpina in Stuttgart in Germany was establishing its own activities in Holland.

Change stage 2: The relationship between Scansped Holland and Panalpina Stuttgart was dissolved. Scansped group acquired Tekatrans in order to solve the agent problem for Scansped Holland in the Stuttgart area. (No agents were available and their own subsidiary lacked the necessary know-how).

Change stage 3: The relationships to Tekatrans' agents in Holland and Belgium were dissolved. New relationships to Scansped in Holland and Belgium were established. Further, the Tekatrans salesman, placed as the agent in Belgium, moved to Scansped Belgium.

Change stage 4: Former agents of Tekatrans had to find new agents. . . .

Five large different nets were involved (Panalpina, Nedlloyd, Scansped, ASG and Uniontransport). These were in different ways cooperating and in the end they had their activities separated from each other. Even though they all found a new representation in the area they had difficulties finding representatives of the same size as suitable alternatives. This had a negative impact on their degree of penetration. Further, the degree of extension was unchanged for the international groups we followed.

In the end, the domino effects triggered Scansped, Panalpina and

Nedlloyd into a movement towards closing up. Scansped ended up being more integrated to fewer companies and in both cases organizations became more concentrated to their group companies. The borderlines between Scansped group, Nedlloyd group, Panalpina group and ASG became more visible and the nets more overlapping.

The Bilspedition case illustrates changes going on at the net level while the other case focuses more on relationship effects of net changes.

In both cases the fact that so many changes in relationships took place caused high costs and new investments both for companies initiating the change and the others being affected.

The results of this case study analysis will be used in the next part as a base for a more general analysis and discussion about domino effects.

DISCUSSION

In this part, we combine the conceptual framework with the results of the case studies into a more general framework and formulate a number of propositions about the occurrence and development of domino effects. The propositions will concern both the prerequisites, sequences of changes, the triggers and the time and speed of the domino effects.

Changes in international networks, increasing international integration and effects at net and relationship level leading to the domino effects are shown in the empirical illustrations. As compared to showing the simple example of domino effects as seen in Figure 1, these changes show a number of sequences of changes taking place almost simultaneously and large effects on the total network. A more elaborated process of domino effects is illustrated below based on the two case studies, starting from an initial change and followed by the number of different change stages.

Domino Effects in Networks

The initial change: A large or radical change takes place in the network through a joining of nets or a splitting of a net in the form of acquisitions, establishing or splitting large strategic alliances, etc.

Change stage 1: The organizations that lost their partners in one or several countries/ies are looking for new alternative partners (agents, subsidiaries, sister companies, partners, etc.). Some more attractive organizations with fast reactions might find new partners directly. Others have to accept short term or temporary solutions.

Some other non-involved representatives that are dissatisfied with their partner take the opportunity to switch.

Change stage 2: Partners not having solved their situation in change stage 1 as well as partners left out as a result of newly established relationships in the first stage are searching for new representatives in different geographical areas. New effects of new acquisitions, joint ventures, etc., take place. Further some shorter term solutions from the first stage are switched to longer term.

Finding new agents gets increasingly difficult as companies either have newly formed partnerships or the representatives are tied to existing groups and the groups are competing. Other non-involved organizations take the opportunity to switch or enter the market. Restructuring takes place.

Change stage 3: Partners to the representatives switching to the first stage ex-agents as well as agents in the second stage are searching for new representatives.

Effects of the switching, from short term to long term solutions, from both change stages are felt. New companies are entering the market as partners.

Change stage 4: Restructuring continues. Changes related to the initial change are getting more and more blurred on account of other contextual changes.

The analysis starts by showing the initial change and then follows how relationships are established and dissolved as a result of splitting and joining of nets. The large number of companies simultaneously looking for agents speeds up the pace of the change. The parallel

continuing the domino effects. The high speed of change facilitates the possibility to detect the domino effects.

What Are the Conditions Under Which Domino Effects Occur?

What are the important prerequisites for the factors triggering domino effects and under what circumstances are they more likely to occur?

Proposition 1

Domino effects are triggered by radical changes at net level such as joining of nets or the splitting of a net.

In both examples the effects originated at the net level and were an integration between nets rather than between organizations. The splitting and joining of nets leading to changes of large numbers of representatives might have to be present in order to get the sequence of changes and the speed needed in order to develop domino effects and make them visible to the market. The number of switchings that take place initially due to a joining or splitting of nets seem to give the number of changes from positive to negative connectedness needed to reach above the threshold discussed by Astley (1985). Obviously both the Bilspeidition merger and the Nedlloyd and Tekatrans cases reached above that threshold. The result was that of domino effects, developed in several directions almost simultaneously, causing the race for new representatives within the industry.

Proposition 2

The higher the degree of integration and complexity of the network, the more likely it is that domino effects will arise and spread when a large change takes place.

We argued earlier that an integrated and complex network would be an important prerequisite for domino effects (Astley 1985, Loucks 1970). In the case studies we can see that there were high interdepen-

changes affected a large number of directly and indirectly connected organizations through their relationships. Since most companies were tied up internationally it was difficult to find suitable new representatives. Very often another alliance had to be broken in order to establish a new one. Furthermore, if the splitting or joining of the net(s) are closely integrated, not only the new partner(s) entering the net but also the existing ones within the net will have to adapt. This increases the risk of conflicts.

The number of conflicts within and between nets will make the network more complex and many companies partly dissatisfied. A joining or split of net(s) will cause larger effects on the network and increase the risk of domino effects.

How Do Domino Effects Develop and Why?

The first stage has taken place and a net is split and two or more nets are joined. Why does the process go on?

Proposition 3

Depending existing degree of international extension and existing business

- a. Domino effects continue partly as a result of the companies' interest in not reducing the degree of extension when leaving one net and joining another.
- b. The more concerned the organizations are to keep and develop existing business and international customers, the higher the likelihood of them selecting a well established representative in the same field, which normally means selecting a competitor's representative, thereby increasing the development of domino effects.

In the conceptual framework we discussed that cooperation mostly involved complementarity and therefore a need to substitute the existing relationship to a partner by another. In the case studies it was shown that the need to keep existing customers satisfied necessitated finding new representatives in the area. Since customers are often internationalized as well, the loss of one customer might have implications for other areas. Furthermore, having a mutual representation

might lead to effects in the home country as well. Lacking the service in another country might also mean losing customers in the home country.

Due to the course of action taken, the domino effects were intensified by the need to retain the existing degree of extension.

In the search for new representatives, the possibility to continue and develop existing business with the new partner is vital. This means that joining a net that has little know-how in existing business areas will probably be a slower and, in the short run, a more costly way.

The companies in the case study therefore speeded up the coordination and integration by choosing a new partner working with a competitor or which was part of a competing net. Such a partner would already have the necessary know-how and the complementary resources as well as existing business to add. Therefore the aim was to keep existing business and satisfy existing customers in these geographical areas.

Proposition 4

The increasing number of organizations concurrently looking for new representatives speeds up the development of domino effects.

Speed is an important factor contributing to the development of domino effects as we mentioned in the conceptual framework. The need to keep existing customers satisfied is one important factor not only causing a search for new partners but also speeding up the development of domino effects. Another important factor, as we can see from the cases, is the increasing number of companies getting involved over time through the stages. Joining competing nets, as in the Bilspedition merger, leads to a large number of organizations looking for new partners simultaneously. Further, as and when one of the organizations finds a new partner, as in the Nedlloyd-Tektrans case, that partner's former partner will temporarily be searching for, and available for a new partnership. The combination of several organizations and partially overlapping nets concurrently searching for alternatives will speed up the changes and the development of domino effects.

Proposition 5

Domino effects are enhanced by companies, dissatisfied with their existing international representation, taking advantage of the turbulence on the market to find new representatives.

The awareness of lifecycles of relationships and nets (Dwyer, Schurr & Oh 1987, Lijegren 1988, Hertz 1996, etc.) seems to accelerate the development of domino effects. As one representative becomes connected to a competing net, like Nedlloyd, Panalpina, Scansped in the cases, integration as well as the trust and commitment to the existing relationship decrease. Periods of decreasing integration in the relationship and in net life cycle are seen as negative and costly. Therefore companies wish to either intensify or finish the cooperation as quickly as possible.

Exactly when the switch takes place depends, of course, on the extent to which there are other suitable organizations also willing to switch. Therefore many of the companies in the case studies found themselves having to accept their second or third choice.

When a large acquisition or alliance is established in the total network, however, many representatives will be available and the timing might also be right for change for companies which were actually neither part of the initial change or of stage 1.

Since at any given time and for different reasons many companies have cause to be dissatisfied with their existing agents, they seem to take the opportunity of making a switch when a new radical change starts a turbulence on the market, just as ERT did in the Bilspedition case. This further enhances the domino effects.

Proposition 6

The importance of the integration dimension is enhanced—sometimes even at the cost of decreasing penetration—by the domino effects, which in turn increases the likelihood of the development of domino effects.

International integration seems to be both a reason for changing and continuation as well as an effect of the changes as more group organi-

cussion on increasing of international integration (Johanson & Mattsson 1988) as well as the interest found in the literature on international business studies over the last decades.

In the Bilspedition case priority was given to the relationships between sister companies in order to safeguard their existing activities and resources for the future. Others established new strategic alliances, joint ventures or acquired new companies. In both cases this led to the dissolution of relationships to other partners. These changes not only enhanced integration of the nets but also continued the development of domino effects.

Sometimes this priority given to the integration dimension has increased at the cost of the penetration dimension decreasing. In the choice between integrating on the one hand with a trusted and reliable smaller representative (agent, subsidiary, J/V, etc.) and on the other having a representative with a high market coverage, a large range of services and many customer relationships, i.e., offering high penetration, a net might prefer the former solution.

In the Bilspedition case, organizations left some large and important agents, resulting in the loss of many customer relationships in the country concerned, in order to keep or develop a higher degree of integration with their own very small subsidiary. In other cases, there were no agents with the necessary coverage and resources available and they just had to settle for an agent with a small penetration of the country.

The six propositions are based on the empirical illustrations but also on the theoretical base in the research on networks and internationalization. The aim of the propositions is to give recognition to the conditions in which the domino effects occur as well as discuss how the domino effects develop. In this we have concentrated our propositions on the triggers and the prerequisites, the development of sequences and the speed of the effects.

As can be seen, we suggested the joining or splitting of nets as important triggers and integrated complex international networks as important prerequisites for these effects. Thereafter, the need to retain existing business and degree of extension starts a race to find new representatives which induces new relationships and sometimes new investment, acquisitions, etc. In this process of turbulence, speed is of the essence since the number of companies involved is increasing.

stances, companies seem to give higher priority to finding reliable partners with whom they can work closely than to focusing on acquiring large resources. Structural changes in the markets are the outcome.

MANAGERIAL IMPLICATIONS

In the discussion, we have already brought up several implications of the domino effects for single companies, relationships and nets as well as for the total network. In this part we will discuss how management can meet, stop or avoid domino effects. We focus only on a few important implications.

From the discussion we learned that domino effects are likely to occur when changes are radical and where the total network is integrated and complex. What are then the possibilities to get the full understanding of the effects in such a context?

A knowledge base would be to learn which organizations and nets that form the total industrial network and how they are connected. Here the international integration in the relationships, nets and the total network can be a useful source of information. Drawing upon their direct and indirect relationships, management will probably be able to depict through "snowballing" some of the most important nets of companies and their cooperations, alliances, J/V, etc. The degree of integration and the lifecycle of changes can play an important role not only for the understanding of the ongoing change processes but also for anticipating future changes.

The next step would be to try to anticipate the risk of dissolution or split, as well as the possible establishment or joining of relationships and nets, by making use of the concepts of negative and positive connectedness as well as complementary and overlapping nets. This would give an idea of where to find latent conflicts and companies waiting for a change. As we saw in the cases, these changes caused turbulence on the market. Like some of the companies in the cases, it would be potential to make use of the turbulence by either looking for new partners or new nets to join. This would mean, on the other hand, a need for flexible planning and selecting possible candidates of interest in advance. Should a new candidate involve substituting an existing partner or net, then the preparations might need to include a plan of how to dissolve the existing relationship.

Unexpected changes will always take place, however. Unexpected

costs and investments when switching or splitting were problems discussed earlier in the paper. This means that possible indirect relationship changes should be thought through before embarking upon the switch and before making the extra financial capital available. One solution we have seen is that companies have fewer but closer partners or give higher priority to certain of their partners. This would lead to better possibilities to influence and foresee changes of strategic relationships within the net. Different options could be to make an acquisition, make a greenfield investment or develop strategic alliances. This would decrease the vulnerability to domino effects in the long run but increase the risk of domino effects in the short run.

In other cases, efforts to decrease dependencies in the net should be considered. One possibility could be to re-engineer the activities of the net and make some partners less important or even redundant and thereby render the focal company less vulnerable to change.

Since the domino effects shorten the decision time and since the suitable partners might not be available, some preplanned short run alternatives might be a possibility while planning long term solutions.

Thus knowledge about the network, timing of changes and rapid company reactions are some of the main factors of importance. Following the lifecycles of relationships and nets as well as looking for negative and positive connectedness are possible ways of getting a good basic network knowledge. Working closely with a few reliable partners and decreasing the dependence on other, less reliable ones, would increase possibilities to influence and foresee the time for dissolution and/or split.

Taken together this would give us some clues about how to prepare for the domino effects, whether meeting, avoiding or taking advantage of them.

CONCLUSIONS

Based on our research on the domino effects we have formulated six propositions about the conditions under which they occur and how they develop. The propositions suggest that domino effects are triggered by radical changes taking place in an integrated and complex industrial network. The interest to retain existing business and the presence of companies taking advantage of the turbulence, lead orga-

nizations to give priority to integrating with partners, thereby continuing the development of the effects.

Since these conditions seem to be present in many contemporary networks, not just that of transport companies, it seems likely that we can find similar effects in other networks specifically in the service industries. Reasons for this are the ongoing international integration, deregulation and privatization of many services (telecommunications, banking, tourism, etc.). However, the increasing degree of knowledge-based industries as well as the degree of service content in many products might also lead to a higher flexibility and lower switching costs also for manufacturing firms, which would make the existence of domino effects more likely in manufacturing industries.

Further, the search to establish just how and when the domino effects occur and develop has revealed a number of driving forces which are endogenous, adding impetus to their development. With this in mind, it would seem likely that domino effects have been present over time in many different circumstances but, due to a slower pace of change, they have been less visible and more difficult to trace.

In an international world where most companies are allied to partners in other countries, the question is less one of an increasing degree of internationalization in general but one of balancing the three dimensions of internationalization. As we have seen the need for stability gives a certain priority to the integration dimension over that of penetration, under the pretext of protecting the existing degree of extension.

The impact of domino effects will be serious for companies in terms of costs and investments. The complexity and the spread of the domino effects spell difficulties, not only in finding new partners but also in investing and planning for the future.

The phenomenon of domino effects poses new questions leading to new areas for future research. How generic are domino effects? In this paper we have focused on large scale domino effects in internationally integrated networks but to what extent can these take place on a smaller scale in other networks.

What are the costs of the domino effects? What conditions could delimit or fuel their occurrence and their restructuring of the industry? How will the investment and the switching costs of a specific relation-

Heide and John (1988) touch upon these questions in their article "The Role of Dependence Balancing in Safeguarding Transaction-Specific Assets in Conventional Channels." In their study small agents balanced their dependence on principals by engaging in offsetting investments in their customer relationships. Thereby agents were increasing the replaceability of the principal and their own attractiveness as agents as well as improving their performance.

Other areas of research would concern how domino effects influence the strategies of the organization and the perceptions of management. Future research should also include how the anticipations of reactions in the network cause periods of intensive changes in the industry, which could contribute to the understanding of restructuring of industries.

NOTES

1. International Encyclopedia
2. Eisenhower (1954) was one of the first to use it as a metaphor in politics about revolutions spreading from one country to another.
3. Positive connectedness is defined as a system for which growth in one part leads to growth in other parts of the system (Cook 1982). A negative connectedness is defined by Cook (1982) as the reversed situation, i.e., when a positive change for one company leads to a negative change for another which can be the case between competing organizations.
4. Complementarity and overlapping concepts are used in a similar sense for nets as positive and negative connectedness are for relationships. It symbolizes the degree to which two nets are either complementary or substituting/competing in their activities and resources.

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