THESIS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Economizing on supply network development

NOJAN NAJAFI

Division of Industrial Marketing
Department of Technology Management and Economics
CHALMERS UNIVERSITY OF TECHNOLOGY
Göteborg, Sweden 2015

Economizing on supply network development
Nojan Najafi
ISBN 978-91-7597-229-9

Doktorsavhandlingar vid Chalmers tekniska högskola
Ny serie nr 3910
ISSN 0346-718X

Division of Industrial Marketing
Department of Technology Management and Economics
Chalmers University of Technology
SE-412 96 Göteborg
Sweden
Telephone +46 (0)31 – 772 1000

Chalmers Reproservice
Göteborg, Sweden 2015

Abstract

This thesis deals with economizing on supply network development. The problematization in this thesis builds on two starting points. First, the ever-increasing importance of purchasing as a function and the role of suppliers as resource providers means that the supply side of firms has become a spring of opportunities for various types of benefits. In business networks, the firms, individuals, what they do, and what they use are all related. Nothing happens in isolation and nothing in the business world stops changing. The interconnectedness and dynamism in business networks reveals the importance of network developments for the firms involved. Consequently, it is important for firms to understand developments in their supply networks. The second starting point for this study is the concept of economic sense-making, which is used to define 'economizing' as a concept with which to study the phenomenon of supply network development. The aim of the study is to develop a framework for analyzing how a firm economizes on supply network developments, and to develop an understanding of supply network development from a firm's perspective.

This study centers on a single qualitative case of the development of a Swedish firm's supply network over a period of almost 13 years. The firm is an automated production flow solutions provider that has a wide network of suppliers spread around the world. Systematic combining has been the underlying methodological approach throughout the study, adjusting and matching the researcher's selection of the theoretical and empirical worlds, resulting in the formulation of the conceptualization of the phenomenon.

The frame of reference is based on the industrial networks approach. Supply networks are analyzed in terms of actors, resources, and activities, all of which are interrelated. Developing a supply network involves developing those elements and their interconnectedness. The analysis uses those concepts to analyze the focal firm's developments in its supply network.

The main result of the analysis is a framework that breaks down developments in a firm's supply network into changes that can be analyzed in terms of the following three dimensions: the *focus* of the change (that is, the change of relatedness among particular network elements); the *direction* of the change (that is, the improvements in the network elements, pursued by the change); and the *scope* of the change (that is, whether the change is of a relational character or concerns connected relationships). Based on these three dimensions, the framework suggests a way to explain how a firm economizes on supply network development in terms of economizing on scale and scope, integration, and innovation. The framework recognizes the dynamic features of economic sense-making by discussing relativity in networks and the effects that a change in one part of the network can have on the others. That discussion is complemented by a set of managerial implications with regard to strategizing in supply network development, and positioning of the study in relation to the streams of research on sense-making and opportunity development to raise research implications. The study ends by presenting three methodological reflections regarding the researcher's use of the systematic combining approach in case research.

Keywords: Supply network development, Economizing, Economic sense making, Industrial Networks Approach, Purchasing.

Acknowledgements

For my entire life, except for the first five years, I have been a student. From the day I started to learn the alphabet, through the countless courses I have passed in my life, I have kept asking myself: "When will I be done with school?!" Since the first year of primary school, the end of each academic year has always been the most joyful moment of that year for me, and every summer I have dreamed of autumns in the distant future that would not begin with school. Oddly, however, the more light I saw at the end of that tunnel, the less appealing the idea of finishing school became! Now, standing at the very end of this road, I can claim that ending my time as a PhD student is by far the most difficult and unwilling completion of school I have ever experienced. The past five years have passed too fast for me to feel that I have accomplished my work, and yet too slowly and joyfully for me to easily leave the PhD student life behind.

For all I have learned and all I have become in these years, I owe a huge amount to my dearest supervisors. Frida, thank you for walking the extra mile a hundred times with me, and for being an enthusiastic supervisor, a sympathetic boss, and an attentive friend. Anna, thank you for believing in me and giving me this great opportunity; thank you for being a staunch navigator and making me realize when I was sailing too far in the dark; and thank you for trusting me so much all along the way – I am proud to have worked with such a tireless and knowledgeable person for six years. And thank you, Ann-Charlott, for your extraordinary analytical mind, for being such an understanding supervisor, for opening my eyes to new perspectives, and for giving me the confidence every researcher needs.

During this process I have had the pleasure of working with many knowledgeable researchers, without whose help I could not have reached this accomplishment. The valuable experiences of co-authoring with Elsebeth Holmen, of the Norwegian University of Science and Technology (NTNU) in Trondheim, and Kajsa Hulthén helped me learn proper academic writing. Co-authoring with Ingrid Hessel became a unique chance for me to engage in the most fruitful discussions I have ever experienced, and my frequent consultations with Lars-Erik Gadde throughout the process made priceless contributions to the advancement of my research. I would like to especially thank Johnny Lind of Stockholm School of Economics for his most constructive contributions as the discussant in my final seminar, and Tim Torvatn of NTNU, Göran Persson of BI Norwegian Business School, and Fynn Wynstra of Erasmus University of Rotterdam for the invaluable discussions during the IMP Journal seminar and IMP Conferences. I am also grateful to my valued past and present colleagues in the division of industrial marketing – Viktoria, Lars, Jens, Klas, Maria, Anne-Maria, Andrea, Igor, Benedikte, and Robert – for their friendships, for offering constructive feedback on my writing and ideas during these years, and for helping me grow as a researcher. My special gratitude is solely for Yvonne: thank you for being so kindhearted and for always being a good listener with that welcoming smile, no matter how busy or stressed you were.

My gratitude also goes to the Elof Hansson Foundation for its support throughout the study.

In addition, I owe a great deal of appreciation to Peter Lindkvist, Per Siesing, and Yalong Yin of FlexLink, and all other participants in the study, whose considerate and open-minded cooperation made the empirical study possible. Moreover, I truly appreciate the time and efforts that the most welcoming employees and suppliers of FlexLink dedicated to helping me conduct the empirical study.

I also owe a great vote of thanks to my large group of friends and colleagues, which has extended considerably in size and depth during my time as a PhD student. Thank you to my dear teammates in CIRC, ISAC, BEST, the Doctoral Students Guild, and the department's PhD student council for the many cherished experiences I have gained working with you. Thank you to my dearest friends who spent most of your weekends in the past couple of years with me, who have borne with me through the thick and thin of writing a PhD thesis, who have joined me in watching all the football matches I wanted to watch, and who have played with me all the games I wanted to play.

I sincerely dedicate this thesis to my lovely and truly tolerant wife, Behnaz, and my devoted and encouraging mom, dad and sister, without whose constant benevolence and inspirations I would have never been able to achieve this. I love you with all my heart.

I wish you all enduring happiness, healthiness, and success.

Nojan Najafi
Göteborg, June 2015

Table of contents

List of Figures

List of Tables

1 Introduction

This thesis deals with economizing in supply networks and strives to develop an understanding of how a firm can economize on supply network development. In this chapter, a background to the research domain and the phenomenon is presented, followed by an introduction to how the phenomenon is problematized and theoretically approached. This chapter ends by discussing the aim of the study.

1.1 BACKGROUND

The growing role of purchasing as a major spender of firms' expenses and a key contributor to the firms' strategic decisions (Gadde and Persson, 2004) has led to handling of the supply side becoming increasingly important for managers and researchers (Hedaa and Ritter, 2005). Håkansson and Ford (2002) discuss how each firm relates to the network in which it is situated and highlight the importance of the supply side for firms based on two major reasons. Firstly, the supply side is the source upon which a firm depends in order to exist. Everything a firm does relies on the utilization of resources to undertake various activities by different actors. However, a firm does not control all resources that it needs. The activities that a firm undertakes relate, in one way or another, to the activities that other firms undertake, and the actors cannot act individually with disregard to what other actors do. Secondly, the supply side is a source of developments for every firm. A firm's developments cannot take place in isolation or without considering the opportunities or limitations that exist outside the firm's boundaries, nor can they disregard the effects that they have for the actors, activities, and resources that lie outside the firm's boundaries.

This importance of the supply side has been shown in both practice and research. As purchasing has developed a more strategic role in companies, suppliers have gained an important role in the firms' attempts to survive and succeed (Gadde and Persson, 2004). A long time has passed since the first important empirical observations that recognized difficulties in switching suppliers, the irrationality of decisions made by firms regarding their suppliers, new purchases that follow previous purchases (Johanson, 1966), the special requirements of large customers (Blois, 1971), and commitment and repetitive exchanges between the same actors (Cook and Emerson, 1978). Therefore, limiting buyer-supplier relationships to individual transactions in which decision making criteria are simplified to transaction costs (Williamson, 1979) makes it impossible to properly describe what goes on between buyers and suppliers. As Richardson (1972:884) puts it, *"so complex and ramified are these arrangements, indeed, that the skills of a genealogist rather than an economist might often seem appropriate for their disentanglement."*

The benefits that can be realized through close supplier relationships, and the relational nature of what happens between firms, has increased the recognition of buyer-supplier relationships among managers and researchers (Gadde et al., 2010). For buying firms, supplier relationships are not only enablers of the buying firm's access to external resources (Håkansson and Snehota, 1995), but also provide the buying firms with numerous opportunities and advantages, such as technological innovation and problem solving (Håkansson and Laage-Hellman, 1984; Masson, 1986; Holmen et al., 2005), learning benefits (Kusunoki and Numagami, 1998; Prockl et al., 2012), logistical integration (Stock et al., 1998; Das et al., 2006), and cost rationalization (Stabell and Fjeldstad, 1998).

The diversity of opportunities is not limited to individual buyer-supplier relationships. Relationships are also interconnected, which brings various opportunities and limitations for firms (Håkansson and Ford, 2002). Hence, managing and gaining benefits from the supply side cannot disregard the interrelatedness of one's supplier relationships, and the relationships beyond those relationships; in other words, the network horizon (Holmen and Pedersen, 2003). Put another way, the interconnected relationships that a firm has with suppliers and other counterparts, or the supply network of the firm, play an important role in the firm's success and survival.

Viewing the business world in terms of relationships and networks, rather than individual transactions, makes it possible to recognize the benefits of inter-firm cooperation (Håkansson et al., 2009). Cooperation is an important feature of business networks. It enables firms to access external resources that help them achieve what they could not have achieved on their own (Håkansson and Snehota, 1989). This cooperation helps create stability in business networks, which enables firms to use each other's help to cut costs, reduce inventories, decrease lead times, innovate, improve quality of products, and develop new products, among other things. Freytag and Ritter (2005:645) open the *Industrial Marketing Management* special issue on 'dynamics in business networks' by asking *"whether stability can still be expected to be a main feature of networks or not"*. On the one hand, cooperation among business counterparts in supply networks requires stability in order to flourish with a multitude of advantages. On the other hand, a firm's position in the network is a function of numerous factors that are never constant. Ford et al. (1986) argue that the heterogeneity of actors, resources, and activities means that no optimum or economic equilibrium can ever exist in business dyads or networks. Firms make changes to reach stability, but stability creates the need and new opportunities for further changes (Freytag and Ritter, 2005).

Previous studies have played an important role in the formation of the current study's understanding of change and dynamism. Ford (1980) suggests analyzing of the evolution of buyer-supplier relationships with regard to the changes of experience, uncertainty, distance, commitment, and adaptation in five stages of 'pre-relationship', early', 'development', 'long-term', and 'final'. Wilkinson et al. (2005) show that both technological and innovativeness similarities and complementarities draw firms towards establishing and maintaining relationships with each other. Fredriksson and Gadde (2005) show that change and stability can co-exist in the achievement of a certain goal. Van der Valk and Wynstra (2005) show how supplier innovation can help a firm cope with change. They showed that even in an industry in which products, product development processes, and coordination among suppliers have relatively low complexity, supplier involvement in product development can be important and rewarding.

Hence, change and development are perpetually inherent in supply networks. All developments in a supply network have antecedents and effects, which have economic dimensions that concern all of the firms involved in the supply network. In a longitudinal case study of 38 years of changes in a firm's supplier base, Dubois et al. (2003) show that customer and supplier relationships can be just as important as drivers for changes as internally set purchasing policy. They also discuss that while the supplier base can be described by continuity with minor modifications in the short run, those minor changes can result in major developments in the supplier base in the long run. Interrelatedness is a defining feature of business networks (Håkansson et al., 2009) and makes the benefits and costs for each firm depend on and affect those of other firms in the network. Hence, the buying firm's perspective, with regard to the firm's relatedness in the network, plays a vital

role in such endeavors to understand and conceptualize the economic aspects of supply network development.

1.2 APPROACHING THE PHENOMENON

Each development in the supply network of a firm brings economic consequences for the firm and other firms in the network. Such economic consequences result from making changes in the structure of the buying firm's supply network. Characterizing each development in terms of those economic consequences can be a way to understand those developments. In an earlier stage of this study (Najafi, 2013a), which built on Håkansson and Persson (2004), the initiation and development of a supplier base was studied and it was suggested that economic benefits that firms approach when making such developments can be grasped in terms of three types of economies: economies of scale and scope, economies of integration, and economies of innovation. At that stage of the study it was shown that there is potential to further investigate supply network development and conceptualize economizing in order to explore the phenomenon; that is, supply network development. In this study, an attempt has been made to provide a framework for understanding the phenomenon in terms of how it makes economic sense for the firm.

The topic of this thesis should not be misunderstood for what Murray Rothbard discussed in his seminal book as 'making economic sense' (1995). Rothbard's use of praxeology in economics was an economist's approach to economic sense making. However, rather than taking an economist's view of the world, the current study takes a business marketer's approach (Alderson, 1958; Alderson, 2006) to the phenomenon of supply network development. The way the phenomenon is approached in this study builds on Weick's (1988) conceptualization of sense making, but with an economic embranchment. Sense making is the process of giving meaning to experience. From this perspective, it is not the situation that defines the appropriate action; it is 'preconceptions' that have a more important role in choosing what to do in each situation. What is and is not appropriate is defined through a retrospective 'motivated assessment' to validate the earlier reasoning behind the action, because *"people often don't know what the 'appropriate action' is until they take some action and see what happens"* (ibid.:306).

Sense making in organizations is *"less about discovery than it is about invention"* (Weick, 1995:13). Weick borrows the concept of the process of enactment (Smircich and Stubbart, 1985) to discuss its product, 'the enacted environment'. Enactment is *"the social process by which a material and symbolic record of action is laid down."* An enacted environment is *"the residuum of changes produced by enactment"* (Weick, 1988:307). This conceptualization is specifically fit for the current study, due to its recognition of two faces for the enacted environment. The public face is what observers of the enactment process view, while the private face is the set of assertions that relate actions to outcomes in terms of expectations of the actors of the *'thens'* that will happen as a result of the *'ifs'* that the actor assumes.

In this study, development in relationships and networks is understood in line with Håkansson and Snehota (1995:19), who said: *"The relationships are not determined a priori but result from enactment, therefore they change and evolve over time."*. Economic sense making is applied in an attempt to investigate and conceptualize the economic aspects in view of enactment. If a firm's supply network is taken as the environment, and enactment as the development process, making

economic sense of enactments in this environment is understood in this study in terms of the firm's (Weick's actor) *economizing* in its supply network.

The Merriam-Webster dictionary defines the verb 'to economize' as to use frugally, or to save (2013). As a concept, from the viewpoint of Williamson (1979), this has meant comparing costs of different commercial decisions and making a choice based on this comparison. Williamson provides an understanding of the organization of economy based on how firms economize for their production and transaction costs: *"The criterion for organizing commercial transactions is assumed to be the strictly instrumental one of cost economizing. […] The object is to economize on the sum of production and transaction costs"* (ibid.:245). Building on that, Jarillo (1988) argues that if the sum of purchase price and transaction cost of a given activity is greater than the internal cost of producing it, the activity will be integrated; if that sum is smaller than the internal cost, the activity is sourced from a supplier. Jarillo (1988) suggests that a network is formed when the profit gained from cooperating parties exceeds the additional transaction costs aroused by their cooperation.

Blois (1990) contradicts this view and suggests that changing the objective from cost minimization to profit maximization can change our understanding of when networks form. Blois (1990) argues that the principles of transaction cost economics are irrelevant when it comes to discussions about the network structure. He bases this argument on three points: ambiguity of the perspective of analysis of transaction costs, problems with decomposition of transaction costs, and limitations of the model in terms of analyzing how different parties assume different parts of the transaction costs.

Håkansson et al.'s (2013:106) view of economizing is different from Williamson's; they write: *"outcomes of the combining and upgrading processes that characterize the given set of interactions […,] typically what we associate with value creation or economizing; the core content of what the economy is about."* With interaction taking the central role, knowledge and operations expand over time and space in the context of economic activities. This *"generates economizing and value creating progress at a pace and impact that actually outperforms alternative forms of economic systems that force actors to deal at arm's length or otherwise constrain freedom to expand knowledge and operations through more advanced interactions"* (ibid.:108). Such an interaction-based view of economizing builds on three features of the interactive business world. First, every interaction consists of a social-material substance. Second, all economic transactions take place in the context of diverse kinds of specialized interactions. Third, each interaction relates to other interactions, and economizing is about upgrading and combining processes through collections of interactions.

The three economic logics (Håkansson and Persson, 2004) discussed earlier in this section also follow this line of thought. Håkansson et al. (2013) call for an interactional conception of 'the economic man' that bears three important features. First, each actor adjusts certain resources and activities to the other actors and expects them to do the same. Second, economic objectives and a net positive outcome are important driving forces on both sides of an interaction. Third, both sides influence each other's perceptions, objectives, and actions.

Hence, in this study, in line with Håkansson et al. (2013), a firm's economizing on supply network development is conceptualized with an interactional approach. This conceptualization of economizing differs from the perspective of transaction cost economics, in line with the above-mentioned arguments of Blois (1990). Instead of emphasizing the 'frugal utilization of money' that underlies the concept of cost economizing in transaction cost economics, here, economizing is conceptualized in terms of different ways that a firm's participation in a development in its supply network can make economic sense for the firm. Rather than focusing on the firm's opportunistic behavior (Williamson, 1991), economizing defined in this study highlights opportunities and possibilities for gaining benefits through collaboration in relationships and networks; this is in line with Håkansson et al. (2013). Building on Weick's (1988) sense-making concept, economic sense making has been defined as the economic logic of a firm behind developments in its supply network. This makes it possible to conceptualize a firm's economizing on supply network developments as a process that is characterized as plausible, social, ongoing, and retrospective.

1.3 AIM

The aim of this study is:

> *To develop a framework for analyzing how a firm economizes on supply network development, and to develop an understanding of supply network development from a firm's perspective.*

The underlying issue to address in order to research this aim and make it approachable is 'how a buying firm's taking part in developments in its supply network makes economic sense for the firm'. To that end, the study seeks to conceptualize economic sense making (or economizing) as a framework for analyzing how firms develop their supply networks. The scientific dialogue introduced above presents two distinctive views of economizing. One view is inspired by transaction cost economics' view of the business world, and the other takes a more interactive perspective, in line with the assumptions of the IMP approach (Håkansson, 1982; Håkansson and Snehota, 1989). Despite the fact that the latter view of economizing remains largely undeveloped, the IMP approach provides a vast collection of analytical tools that can form the backbone of an analysis in order to present an interaction-based conceptualization of economizing. Such emphasis on the recognition of the interactive nature of how supply networks develop is essential for the aim of this study given that the background presented in section 1.1 calls for a holistic view when researching developments in supply networks. This study is an attempt to increase our understanding of supply network development by developing a framework that can help explain the phenomenon.

The framework is built on the basic assumptions of the IMP approach and makes deliberate use of the Activities/Resources/Actors (ARA) model (Håkansson and Snehota, 1995). The IMP tradition highlights interactions in the business world and the interdependencies among its entities. The ARA model decomposes the business world into actors, resources, and activities and the way these elements are interconnected in the contexts of business relationships and networks. A set of IMP-based analytical tools are presented in the next chapter and subsequently used to analyze how development of the ARA elements of the focal firm's supply network can be understood and conceptualized in terms of economizing. The description of those analytical tools follows a brief

description of the IMP tradition and previous studies on supply network development and economizing, followed by a discussion of the problem leading to three research questions.

Chapter 3 presents the methodological considerations of this study with an emphasis on elaborating on its systematic combining process. Chapter 4 includes a detailed description of the case, which Chapter 5 analyzes empirically using the analytical framework presented in chapter 2. Chapter 6 builds on that analysis and answers the research questions in order to develop the framework promised in the aim. This is done using examples from the case as illustrations of developments in a firm's supply network. Chapter 7 summarizes the analysis and presents the framework developed in the study in order to gain an understanding of supply network development from a firm's perspective. The framework is also discussed in that chapter in terms of its dynamics, positioned in relation to specific other threads of research, and deliberated for its implications for practitioners and future research.

2 Frame of reference

This chapter presents the theoretical basis for approaching the aim of this study, which has been conducted in the interplay between theory and empirical information. However, presenting the theoretical concepts after the introduction of the aim and the phenomenon – and before the empirical description – may cause a misinterpretation about the role of theory herein. The reason for this structure of presentation is that it would not be fruitful to structure the thesis to reflect exactly the process of the study as it was conducted. To solve this problem, a thorough description of the process and reflections on it are presented in chapter 3, and the theoretical concepts are presented in such a way that the structure of the presentation can support the relative roles of theory and empirical information in the study.

The current chapter starts with a theoretical background to the theoretical approach underlying the study, the IMP tradition, with regard to the problem of supply network development. This is followed by discussion of some previous studies on supply networks. The three types of economies that play a central role in the approach of the study – scale and scope, integration, and innovation – are presented next, to elaborate on what is meant by each of them. That theoretical background is followed by an analytical framework and a problem discussion, where the aim of the study is explored and three research questions are presented with which to approach that aim.

The framework is made of various theoretical concepts that help analyzing the case and forming the model presented at the end of the thesis. Concurrently, the structure and content of the framework in section 2.4 is a product of the research process. The framework presented at the end of the thesis is based on the theoretical concepts and the framework structure presented in section 2.4. The analyses in chapters 5 and 6 make use of the content and structure of the framework in section 2.4, and have contributed to its formation. The starting point for those analyses is the problem discussion presented in section 2.5.

2.1 THE IMP TRADITION

Inter-organizational research has been a wellspring of various theoretical approaches throughout recent decades, all attempting to understand the varied phenomena that reside under the umbrella of a key question – what transpires between firms.

Until the 1990s, the lasting relationships between buyers and suppliers was seldom recognized in the dominant theoretical approaches to inter-organizational issues. Despite this negligence in other strands of theory, since its early years the Industrial Marketing and Purchasing (IMP) tradition has emphasized the importance of such relationships and interdependence among firms. The IMP group took shape in 1976, as two consecutive research projects spanning several countries, starting in Sweden, United Kingdom, France, Italy, and Germany, then spreading wider to cover empirical studies in Australia, Japan, and the United States.

The antecedents of this project were studies both in Europe and the United States. One such example was the notable study of the Swedish steel industry by Johanson (1966), which observed the existence of lasting buyer-seller relationships in business markets, thereby pointing out severe shortcomings in the marketing theory at the time. In contradiction to existing marketing literature, this early and fragmented research had established that purchasing was a multi-person activity, that customers were often reluctant to change their sources of supply, and that there was a

surprising degree of stability and durability in their dealings with many of their suppliers. Risk-reduction and satisfaction-seeking behaviors were evident, and even large, powerful customers frequently sought cooperation with suppliers rather than coercively and unilaterally exercising their purchasing power in "the market." Such cooperative behavior developed through relationships often entailed modifications and adaptations of both products and systems, both on the buying and selling sides. Based on those early research findings, the key hypotheses of those research projects posited that the content of supplier-customer relationships is significantly broader than simple economic exchanges (Cunningham, 1980).

According to Håkansson et al. (2009), the IMP tradition drew considerable inspiration from the fields of marketing (Alderson, 1954; Alderson, 1957; Alderson, 1965; Twedt, 1964; Mattsson, 1969; Stern, 1969), business economics (Penrose, 1959; Richardson, 1972; Alchian and Demsetz, 1972; March and Simon, 1958; Cyert and March, 1963), and organizational and social sciences (Homans, 1961; Blau, 1964; Levine and White, 1961; Litwak and Hylton, 1962; Evan, 1966; Thompson, 1967; Van de Ven et al., 1975).

Since these projects were designed to understand the patterns of dependencies and adaptations between companies and the evolution of their relationships over time, as well as elements of social exchange, the theoretical outcome was naturally along these lines as well. First, the efforts resulted in interpretative schemes and conceptual frames that capture the nature of buyer-seller relationships in industrial markets, known as the Interaction Approach (Håkansson, 1982). Later, this theoretical frame was further developed to incorporate interdependencies between relationships, resulting in new analytical tools such as the Activities/Resources/Actors model, known as ARA (Håkansson, 1987; Håkansson and Snehota, 1995) and the 4R (four resources-entities) model (Håkansson and Waluszewski, 2002).

The IMP work is a departure from traditional purchasing studies in a number of ways. First, the emphasis was placed on relationships between buyers and sellers; this was in contrast to the traditional literature, which tended to focus on single discrete purchases. Second, the need to examine the interaction in buyer-seller relationships was in sharp contrast to the then-dominant view of industrial marketing as the manipulation of marketing-mix variables in order to receive response from a faceless and passive market. Third, the stability of industrial market structures was stressed, in contrast to the conventional view that implies an atomistic structure and the assumption that markets consist of a large number of buyers and sellers that frequently changed roles. Fourth, the simultaneous analysis of both the buying and selling sides of relationships was contrary to the previous separation of industrial marketing and purchasing tasks (Dubois and Araujo, 2004; Håkansson and Snehota, 2000; Turnbull et al., 1996). The IMP tradition, its view of the world, and its analytical tools play the central role in this study because supply networks have two important features – they are dynamic and interconnected.

Based on various previous observations (e.g., Johanson (1966), Håkansson (1982), and Gadde and Mattsson (1987)), Håkansson and Snehota (1995) suggest a number of structural and process characteristics of relationships. Structurally, they conceptualize relationships as being continuous, complex, symmetrical, and informal. Various relationships between buyers and sellers have been shown to be long-lasting. In many cases, the individuals on both sides of a relationship have been found to be numerous, and to embody many different functional and organizational levels.

In many relationships, both the buyer and the supplier have opportunities to influence the other and initiate changes. Formal contracts only play a limited role in many observed business relationships, while informal contacts between parties are vital in resolving conflicts and dealing with uncertainties. Besides, relationships can be understood as processes that contain adaptations, cooperation and conflict, social interaction, and routinization. Developments in buyer-supplier relationships are dependent on mutual adaptations of various kinds. Firms involved in business relationships not only cooperate, but also experience occasional conflicts; some level of cooperation and conflict is necessary for the continuous development of every relationship. Relationships are not limited to professional contacts; they have a social content that helps form and develop relationships. In addition, various routines and explicit or implied rules of conduct form in relationships over time, and these shape the way the parties involved in the relationship deal with each other.

Håkansson and Snehota (1995) distinguish between two views on business relationships; the first view deals with relationships in isolation, while the second recognizes the interdependencies among relationships. In the first view, developments in a relationship result from intra-relationship reasons. However, in the second view, the factors external to a relationship are seen as important in explaining developments in the relationship. Such factors arise in the other relationships related to the focal relationship. Within a buyer-supplier relationship, developments in the other customer or supplier relationships of the buyer and the supplier can affect and be affected by the developments in the focal relationship. This view implies *a network approach,* an approach that recognizes interdependence among entities in a business network. Important implications of such an approach are that development and performance of companies are defined as a matter of relationship development, efficiency is understood in relation to customer and supplier relationships, and the success of the counterparts is valued as an important factor in the success of the focal firm.

Håkansson and Snehota (1995) suggest that the business world is made of actors, resources, and activities that interact and are interconnected. This conceptualization of buyer-supplier relationships identifies two dimensions for relationships: substance and function. The substance of a relationship contains the connections between the activities, resources, and actors on the two sides of the relationship. The function involves the effects of the relationship for different entities, comprising the dyad itself, the individual company, and the network. Hence, development is defined as a result of the interplay between the connectedness of the network elements; in other words, activities, resources, and actors.

Using the ARA model, business relationships and networks can be analyzed in terms of how actors, resources, and activities are interconnected. On a relational level, the connectedness can be grasped in terms of actor bonds, resource ties, and activity links, while on a network level this connectedness is conceptualized in terms of actor webs, resource constellations, and activity patterns.

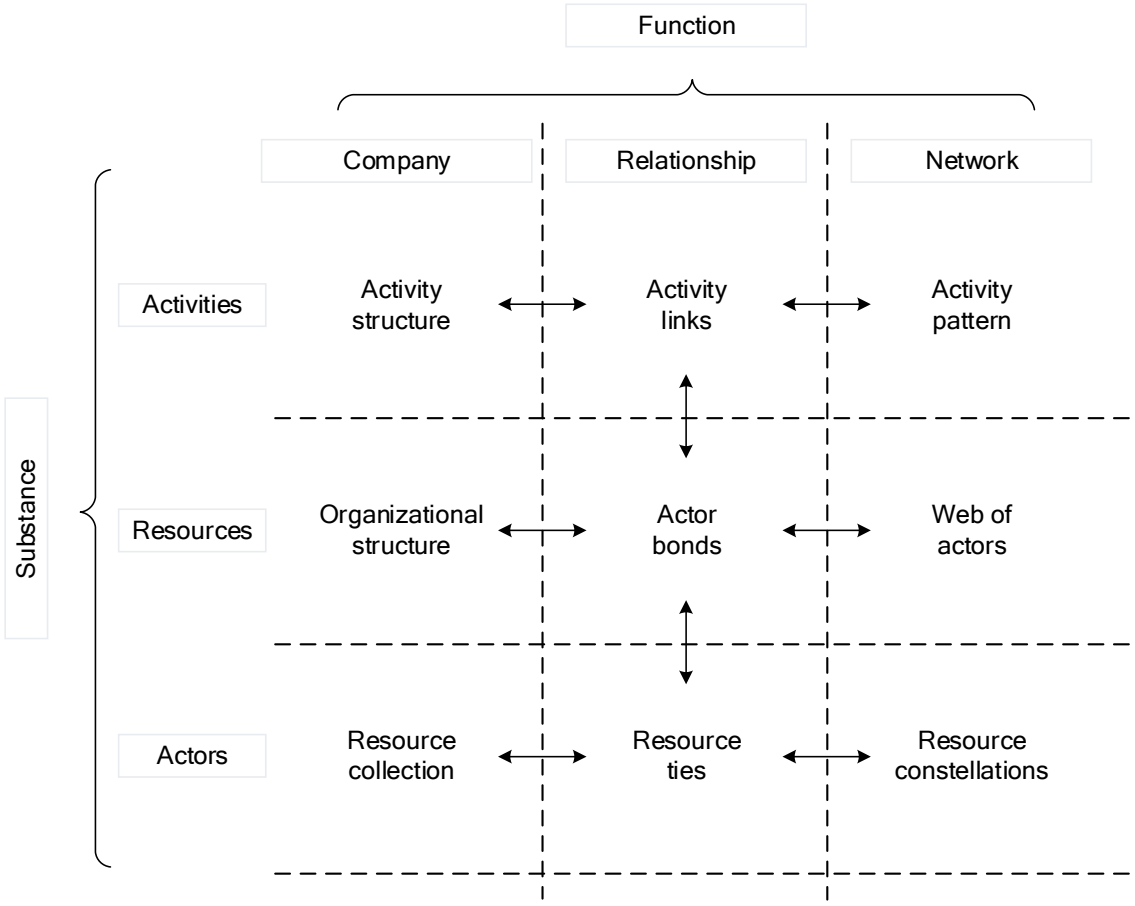


Figure 2-1: Development effects of business relationships (source: Håkansson and Snehota (1995:45))

2.2 SUPPLY NETWORKS

Harland et al. (2001:22) defined supply networks as subsets of wider inter-organizational networks that include *"interconnected entities whose primary purpose is the procurement, use, and transformation of resources to provide packages of goods and services."* As compared to the general notion of a "network," Johnsen et al. (2000) defined a "supply network" from a buying firm's perspective, and emphasized that it focuses on the production and delivery of products through the supply network to the customers. In this study, supply networks are understood in line with the above definitions, and an attempt is made to understand the supply network of a firm in terms of the actors, resources, and activities that constitute it.

The Industrial Marketing and Purchasing (IMP) tradition understands supply networks by analyzing how different actors involved in them mobilize resources to undertake different activities (Gadde et al., 2010). As described earlier, the IMP tradition emphasizes the interrelatedness of entities within the supply network by recognizing bonds between the actors, ties between the resources and links between the activities involved.

This study deals with supply network development. Developments in a supply network can be analyzed from different perspectives and in relation to different aspects of the developments. As discussed earlier, Håkansson and Snehota's (1995) framework for analyzing developments in business relationships suggests that developments in a relationship are affected by and affect developments in other relationships. Holmen et al. (2007) distinguish between the management of supply base and supply network, and suggest that, in supply base management, decreasing the

number of suppliers in the base is important. When discussing supply base management, such topics as supply performance management, structure (organization) of suppliers, the extent of buyer-supplier relationships, and changes in these relationships are among the most popular. Gadde et al. (2010) identified variety, complexity, and heterogeneity of resources as important issues in relation to supply base management, and emphasize the role of purchasing in dealing with those issues. Many studies of supply base management have focused on a tier logic, where the focal firm has close relationships with a few suppliers, and those suppliers are in turn responsible for ensuring that other suppliers needed to fulfill the demand of the focal firm are appropriately organized (Gadde and Håkansson, 2001; Holmen et al., 2007).

Supply base management is central to any discussion regarding supply network management, as the development of the supply network at any point in time is based on the existing structure and characteristics of the supply base at that time (Gadde et al., 2010). In supply network management, a network perspective is mainly used. The interrelatedness of buyer-supplier relationships (and linking suppliers in the network to one another) is the most explicit aspect of such discussions. The supply network structure and the initiation and creation of management and change processes within supply networks are also highly relevant in research on supply network management (Holmen et al., 2007). In supply network management, the role of the focal firm in connecting the suppliers within the network is generally emphasized more (Srai and Gregory, 2008).

Supplier relationships and supply networks are dynamic; they develop over time, and change is one of their fundamental characteristics. The firms involved in a supply network develop the supply network in terms of changing the way activities, resources, and actors are interrelated across the network (Holmen et al., 2007), and every development comes with particular economic consequences for the individual firms involved. Hence, it is relevant to study the processes of development of supply networks (Halinen and Törnroos, 2005). Besides the works of Ford (1980), Dubois et al. (2003), Wilkinson et al. (2005), Van der Valk and Wynstra (2005), and Fredriksson and Gadde (2005) that were discussed above in chapter 1, various other studies have tried to capture change and development in business networks, and have approached supply network development from several different viewpoints. Some studies focus on the initiation of supply networks (such as Holmen et al. (2007) and Holmen et al. (2003)), while others investigate improvements in supply networks (such as Srai and Gregory (2008), Ebers and Grandori (1997)). Many studies have focused on the development of buyer-supplier relationships (Gadde and Snehota, 2000; Araujo et al., 1999), while others have centered on supply networks and studied their overall development (Harland et al., 2004; Holmen et al., 2007). The problem of supply network development is not limited to the purchasing and supply management area; today, it has become a multidisciplinary field with contributions from (and to) different fields, such as computer engineering (e.g., Muessigmann and Albani (2006) and Albani et al. (2004)) and production management (e.g., Srai and Gregory (2008)).

Gadde et al. (2003) identify three strategic issues a firm faces with regard to the network surrounding it. The first strategic issue centers on the process by which a firm finds the appropriate levels of involvement in its relationships with each of its counterparts. Viewing relationships as resources (Håkansson and Waluszewski, 2002) implies that the most important resource development process in the firm is the development of its relationships, because it is the firm's relationships that enable both provision and consumption of its other resources. In order for firms

to be able to efficiently invest in the development of their resources, they have to consider the ways that those developments would impact their relationships and how the development of their relationships relates to their other resources. Within a network perspective, this issue must also be considered with regard to the ways that different relationships of the firm affect each other. Changes by a firm in one of its relationships should be in line with the changes that the other counterpart makes in the relationship, and with the changes that the other counterparts in the network make or intend to make (Gadde et al., 2003).

The second strategic issue concerns finding a balance between the extents to which the firm influences the other firms and is influenced by them. By implementing their strategies, firms influence each other. Given that the activities of different firms are interdependent in the network, each firm's implementation of its strategies must consider how its own activities are related to the others' activities and ambitions.

The third strategic issue is about the extent to which each firm should strive to control the others in the network. Networks neither have centers nor borders (Håkansson and Snehota, 1995), because the loose connectedness of actors and the relationships among them does not allow a single firm to lead the rest. In such a system, all actors purposefully attempt to direct the coordination and combination of their resources to influence each other. In this process, relationships co-evolve and impact the evolution of the actors involved in them. Therefore, by attempting to influence each other, actors expand the opportunities for development in the network and at the same time create restrictions for each other that encumber innovation (Wilkinson and Young, 2002).

2.3 TYPES OF ECONOMIES

Gadde et al. (2010) presented three perspectives on supplier relationships – relationships as alternatives to markets, relationships as a means of accessing supplier resources, and relationships as a norm. In the first theoretical perspective, relationships are analyzed based on the products they include. Hence, they can be analyzed through portfolio and segmentation models such as Kraljic (1983), where the purchase of each product is optimized by minimizing supply risk and maximizing the exploitation of buying power.

In the earlier studies within this line of thought, interaction is not considered important (for example, Kraljic (1983)). According to Dubois and Pedersen (2002), in later studies that emphasized portfolio models (such as Olsen and Ellram (1997), Nellore and Söderquist (2000), Gelderman and Van Weele (2005), and Van Stekelenborg and Kornelius (1994)) buyer-supplier collaboration is considered only in light of the importance of "market control" and "power-dependence" structures. The lack of consideration of the supply network and taking the supply network for granted in portfolio-based approaches have created a rather firm-internal focus for such approaches.

In the second perspective, a supplier relationship is understood based on the interfaces (Araujo et al., 1999) that connect the resources on both sides of the relationship. This perspective offers a view of supplier relationships that centers on relating resources the firm considers as internal with resources that are external to the firm, but to which the firm has gained access through the supplier relationship. Therefore, instead of trying to optimize every purchase or offering, this perspective

suggests assessing the capabilities of the supplier and the potential advantages those capabilities can bring to the firm. Resource heterogeneity and a supply-network view are among the important features of this perspective (Gadde et al., 2010).

The third perspective emphasizes the interdependence of buyers and suppliers and the opportunities that that interdependence presents for reaping benefits of different kinds. The model presented by Håkansson and Persson (2004) discuss these benefits in terms of three types of economies that firms can strive for when dealing with their suppliers. Gadde et al. (2010) elaborate and discuss those types of economies: economies of *scale and scope*, *integration,* and *innovation*. The three types of economies are presented below.

Economies of scale and scope provide a logic that deals with reducing costs and increasing efficiency. Various streams of inter-organizational research have examined cost rationalization and how costs can be reduced by making a change on the supply side of a firm. Coase (1937) claimed that the growth of firms is limited by the costs of undertaking more activities, and Williamson (1979) based his model of transaction cost economics on that assumption. In Chandler's (1990) viewpoint, the definition of economies of scale includes reducing the cost per unit of a product by increasing the scale of its production. He defines economies of scope in terms of, for example, making a variety of products using a particular raw material. Compared to using that raw material only for one type of product, here the firm has the possibility to gain more from the raw material and hence reduce the cost per unit (ibid.). Stabell and Fjeldstad (1998) present the idea of cost rationalization in their conceptualization of the value chain, in which the logic of value creation is to transform inputs to products. This logic necessitates a role for marketing that involves handling product specifications and volume estimates on the one hand, and stable operations and capacity utilization on the other.

Dubois (2003) illustrates a firm's attempt towards reducing costs by rationalizing the supplier base. That attempt is centered on a change of unit of analysis, from a transactional view towards a relational consideration of costs on the supply side of the firm. Further, it is shown that for the new perspective to work, the firm needs to take into consideration the way each supplier relationship relates to the other relationships in the network, which can include the supplier's suppliers, the customer's other suppliers, the customer's customers, and the supplier's other customers.

Gadde and Håkansson (1994) discuss the idea that close relationships with suppliers have become attractive for managers for a couple of reasons; firstly, they enable firms to better exploit the suppliers' resources for technical development, and secondly, they provide opportunities for rationalization of administrative, production, material flow, and R&D costs through close relationships. Blois (1971) discussed this phenomenon in terms of gaining *economies of scale and scope*. For example, scale economies are achieved by increasing the volumes produced by a certain machine, and scope economies are attained by expanding the variety of products produced by that machine (ibid.). To improve the utilization of a resource, the undertaking of activities that require the same resource need to be increased, as through similarity in activity interdependencies (Richardson, 1972). Gaining economies of scale and scope is possible in both high- and low-involvement buyer-supplier relationships; however, a strategy limited to high extents of technical and administrative adaptations of the resources of the buyer and supplier may be needed in order for firms to gain economies of scale and scope (Håkansson and Persson, 2004; Najafi, 2013b).

Standardization of a product that a supplier manufactures for a buying firm can bring economies of scale and scope, because the buyer can share the costs of that product with other customers that buy the same product from the supplier. To gain economies of scale and scope, the collaboration between buyers and suppliers centers on reducing costs by improving the efficiency of activity and resource allocation (Gadde et al., 2010).

Besides cost rationalization, much attention has been paid to supply chain integration in supply chain management literature (Carter and Ferrin, 1995; Das et al., 2006). Gadde and Håkansson (1994) highlight integration as a key feature of supply chain management, and Stock et al. (1998) suggest that integration of logistical activities across multiple firms through linked buyer-supplier relationships is an important means of competitive advantages for the firms involved. By coordinating logistical and production activities, firms manage to gain several cost benefits. Yao et al. (2007) show how collaborative initiatives between buyers and suppliers, such as a vendor-managed inventory system, can contribute to different extents of inventory cost savings for the buyer and the supplier. Das et al. (2006) demonstrate that, through buyer-supplier integration, firms can benefit from coordinating their production schedules and make their conflicts more valuable.

Opportunities for closer cooperation, gained through supplier base reduction initiatives, have been shown to contribute to certain cost benefits, including reduced costs of inventory management (Das et al., 2006) and logistics (Bozarth et al., 1998). Simatupang et al. (2002) present a framework for analyzing inter-organizational coordination in a supply chain. Their framework is built on two dimensions of the focus and mutuality of coordination. The focus of coordination deals with whether the coordination concerns operational linkages or organizational linkages: The mutuality of coordination involves whether the coordination entails complementarity of processes that are to be coordinated, or coherence and alignment of the chain members' understanding of context, viewpoint, purpose, and actions. Based on those dimensions, Simatupang et al. (2002) suggest that coordination can take any of the following four forms: logistics synchronization, with the aim of coordinating products and logistics processes; incentive alignment, with the aim of creating a common understanding of benefits and risks; information sharing, with the aim of making information available to multiple parties in the supply chain; and collective learning, with the aim of spreading and converging practical knowledge across the supply chain.

Håkansson and Persson (2004) refer to such advantages as *economies of integration*. In order to economize on integration, the relationship needs to focus on the coordination of complementary activities. Complementary or serially linked activities are activities where the completion of one is a prerequisite for the start of the other (Thompson, 1967). Such coordination entails linking and joint planning, and is made possible through adaptation of administrative resources (Gadde and Håkansson, 1993). Piller and Moeslein (2002) describe economies of integration as cost-saving opportunities that result from social interaction between the buyer and the supplier and elimination of waste on different levels.

Gadde et al.'s (2002) case study of a petroleum products manufacturer's improved cooperation with a supplier of critical and expensive equipment shows how improved cooperation can generate economies of integration. Through the creation of a pool of equipment that was shared between the two companies, equipment availability was considerably increased and excess investment in

spare parts and equipment was avoided. Economies of integration can be gained in highly integrated activity settings, where, for example, a JIT system is in place in a buyer-supplier relationship. However, gaining such economies is not limited to the above; sharing production plans, informing each other of forecasts and market plans, and connecting to sub-suppliers through suppliers – while possibly less integrated – can still represent promising arrangements for achieving economies of integration (Gadde et al., 2010).

Håkansson and Persson's (2004) conceptualization of economizing in buyer-supplier relationships also recognizes *economies of innovation*. It was shown in an earlier stage of the study (Najafi, 2013b) that close cooperation between the buyer and the supplier, joint work on operational problems, and the involvement of both parties in product development, communication, and knowledge sharing can be grounds for achieving economies of innovation. The economies derived from such actions cover a long range of economic benefits, including preventing quality problems (Masson, 1986), improved internal service quality, enhanced external product and service quality (Stanley and Wisner, 2001), long-term benefits derived from teaching and learning (Prockl et al., 2012), and facilitation of tacit knowledge transfer (Kusunoki and Numagami, 1998). Furthermore, buyer-supplier cooperation enables each party to achieve economies of innovation by accessing the other party's investments in knowledge-based resources (Najafi, 2013b), such as cooperating with the suppliers for developing new products (Van der Valk and Wynstra, 2005) and pursuing synergies that can help solving various operational and product development-related problems (Scannell et al., 2000; Das et al., 2006).

Adaptations of knowledge-based resources (Gadde and Håkansson, 1993) and a high extent of interaction between different types of actors are prerequisites for gaining economies of innovation (Najafi, 2013b). According to Ahuja (2000), indirect ties in the network, such as connected relationships, are important sources of knowledge, contributing significantly to the firm's innovation output. Soosay et al. (2008) discuss that continuous innovation is made possible in collaborative relationships through initiatives such as the sharing of knowledge, information, and processes. Economies of innovation lie in the joint experience of companies resulting from long term cooperation, and the knowledge that each company gains over time regarding the needs and capabilities of the other (Gadde et al., 2010). Firms can also seek economies of innovation by investing in joint efforts aimed at developing new products and services, sharing resources, and adapting resources with other firms in the network (Persson and Awaleh, 2004).

How firms pursue different types of economies can be analyzed in the context of their actors, resources, and activities. Over time, the settings in which firms have designed their attempts to achieve each type of economies develop into new webs, patterns, and constellations, and opportunities appear for economizing in new ways. Several types of economies may be pursued by each firm in each of its relationships (Gadde et al., 2010), or across its relationships at the same time, and the attempts of other actors to reach economies in the relationships between them can result in new opportunities and challenges for the firms involved (Najafi, 2013b).

2.4 ANALYTICAL FRAMEWORK

The framework presented in this section intends to problematize supply network development in relation to the three network layers of activities, resources, and actors, in order to understand and conceptualize the different ways in which developments can make economic sense. Developments

in supply networks produce changes that take place in the three network layers. This framework intends to problematize and prepare explanations of how a firm's supply network developments make economic sense.

2.4.1 DEVELOPING THE NETWORK IN THE ACTIVITY LAYER

In an earlier phase of this study[1], it was shown that in order to understand the economic benefits that can emerge from a firm's attempts to develop their supplier base, the ways in which activities of the suppliers and the buying firm are interdependent need to be analyzed. Interdependence is always present, and can be strengthened as a result of adjustments. Interdependence cannot be seen as something to be avoided; instead, the focus should be on "how to deal with it" (Dubois et al., 2004).

Araujo et al. (2003) suggest that boundaries of firms are multifaceted, and should be defined from a wider perspective than only costs and direct capabilities. As Håkansson and Ford (2002) claim, the view implying managing *of* networks must be replaced with managing *in* them, because the important role that interdependence plays in industrial networks makes boundaries of optimization, control, and competition indistinct (Dubois et al., 2004). According to Håkansson et al. (2009), an optimal situation, in which all activities are completely harmonized and all resources are put to their best possible use, can never exist; before the optimal state is reached, the optimal conditions will have already changed. Hence, adjustments constantly take place in activity patterns, and firms are required to adjust their activities in relation to each other: *"opportunities for such changes have to be built into the activity configurations when they become established"* (Håkansson et al., 2009:111). Therefore, there is a need to identify such opportunities and conceptualize them, in order to be able to understand the developments in the activity dimension in relation to how they make economic sense.

Activities in industrial networks

Thompson (1967) determines three forms of interdependence. *Pooled* interdependence exists between two activities that either share a common resource or are both related to a common activity. *Sequential (or serial)* interdependence is present when the input to one of them is the output of the other. *Reciprocal* interdependence between two activities is present when not only the output of one is the input of the other, but also the input to the first activity is somehow dependent on the output of the second. Based on this categorization, Dubois et al. (2004) suggest that no activity, product, or resource can be individually optimized. When improving a firm's activities, design of products, or utilization of resources, efficiencies can be achieved by taking into consideration how different activities are interrelated, and how this interrelatedness is best handled when managing in networks. Hence, in this study, developments in the activity layer are analyzed in terms of developments of activities and their interconnectedness.

To operate and manage in networks, Richardson (1972) shows that firms undertake specific types of coordination for specific types of interdependencies (that are similarity, complementarity, and close complementarity). Firms try to specialize in activities for which their capabilities provide comparative advantages, and "similar" activities are coordinated by "direction"; in other words,

[1] In my licentiate thesis.

within the firm. Direction occurs when several activities require the same resource for control and planning, and they need to be consolidated in a single organization.

"Complementary" activities, in contrast, require both qualitative and quantitative coordination. This can be done by direction, "cooperation," or "market transactions." Owing to the fact that complementary activities are not necessarily similar, and that economies of scale are important in motivating consolidation, direction may not always be the best way to coordinate complementary activities. Cooperation takes place by matching the related plans of different parties. "Closely complementary" activities are those in which matching of particular activities is required. Consolidation of these activities within an individual firm and close cooperation between those firms that carry out these activities are two ways of coordinating closely complementary activities.

Richardson (1972) uses the definition of and distinction between the types of interdependencies to explain the rationale behind the existence of relationships. In understanding how economies emerge as supply networks develop, interdependencies are a valuable tool. It is important not only to investigate how the focal activities are interdependent, but also to analyze how these interdependencies change as firms develop their supply networks. Bankvall (2011) puts the concepts of interdependencies and adjustments at the core of his analysis of *"activity linking."* He defines adjustments in terms of changes in the links between activities: *"whereas interdependencies specify activity links, adjustments target their change"* (Bankvall, 2011:25). Activity interdependencies are formed both through activity adjustments and result in further adjustments (Håkansson et al., 2009; Bankvall, 2011). According to Håkansson et al. (2009), analyzing activity adjustments makes it possible to gain an understanding of how activities within a network are interdependent and interrelated.

In exploring the economic consequences of interdependencies, Håkansson and Persson (2004) contend that each of the aforementioned types of economies can be achieved by relying on one of Thompson's (1967) types of interdependencies. Building on that, in an earlier phase of the current study, the emergence of the three types of economies was viewed in the light of Thompson's (1967) and Richardson's (1972) conceptualizations of activity interdependencies. It was shown that similarity or pooled interdependence among activities enables firms to better utilize their resources, and thereby exploit economies of scale and scope, while complementarity or sequential interdependence requires coordination among activities, leading primarily to the emergence of economies of integration. Reciprocity among activities is usually the basis for the emergence of economies of innovation, because they exist between activities that need mutual adjustments, and thus require interaction between the parties involved.

Both Richardson's and Thompson's frameworks are bi-dimensional; they both conceptualize activity interdependencies by analyzing activities in relation to resources. Håkansson et al. (2009) propose a different categorization of activity interdependencies that focuses on the activity dimension. The model recognizes *serial*, *dyadic* and *joint* interdependencies. The first type is serial interdependence, which is based on the same logic as Richardson's complementary and Thompson's sequential interdependence: Two activities with serial interdependence are such that one cannot be performed prior to the completion of the other. It is suggested that tighter process integration can increase the joint performance of activities that are interdependent in this way. Therefore, coordinating such activities enables firms to economize on integration.

Dyadic interdependence, the second type, resembles the underlying logic of Thompson's reciprocity, where the output of each of the two activities is input to the other. Håkansson et al. (2009) indicate that the outcomes of activities that are interdependent in this way are not standardized, and such interdependencies arise when two activities are mutually adjusted. Such mutual adjustments build on high levels of interaction and information sharing, and can bring economies of innovation.

The third type, joint interdependence, comprises two activities that are both related to a third activity. The performance of activities that are interdependent in this way depends on each other, and can be improved by the use of rules, routines, and standards. This interdependence among activities can provide for economies of scale and scope. Håkansson et al. (2009) argue that all activities are simultaneously subject to all three types of interdependencies in relation to different activities.

Sequentiality and similarity of activities

Håkansson et al. (2009) present a framework for analyzing activity patterns, based on these three types of interdependencies. The framework allows for viewing spectrums of different situations in activity patterns, and thus is useful for the development of a framework for analyzing economizing in relation to the activity dimension of the supply network. The framework analyzes any pattern of activities in two dimensions of sequentiality and similarity.

In the sequentiality dimension, it is shown that serial activities can be *loosely* to *tightly* sequential. A spectrum classifying sequentiality by different levels of intensity can be identified between two serially dependent activities; on the higher end, it resembles Richardson's close complementarity, while the lower end corresponds to complementarity between two activities in which the second one is not adjusted to the first. This loose interdependence can emerge because of the existence of other activities in between the two focal ones, or simply less need for the adjustment of plans and schedules of the focal activities. Therefore, investigating the degree and nature of the sequentiality of the activities in focus can be important in identifying opportunities for economizing on developing activities that are sequentially interdependent.

The similarity dimension is another characteristic of every activity pattern. Firms require a *diverse* set of activities in order to be able to widen the scope of their business with different counterparts, while they need *similarity* in the undertaking of their activities in order to be able to use their resources efficiently. Dyadic interdependence is more suitable when diversity in the activity pattern is in focus, while joint interdependence is present when an activity pattern is characterized by similarity. Therefore, similarity provides for economizing on scale through standardization, enabling the use of one activity configuration for activities carried out in large scale. Otherwise, if customization of activities is required in an activity pattern, it can be characterized by diversity. Hence, the combination of similarity and diversity in the activity pattern defines its efficiency and the economic benefits that can be gained from development in the pattern.

2.4.2 DEVELOPING THE NETWORK IN THE RESOURCE LAYER

In industrial networks, firms access each other's resources and develop them in combination with each other. The values and features of resources are defined in relation to each other through interactions among the actors in the network. Hence, both providers and users of a resource experience economic consequences when the resource is developed (Håkansson and Waluszewski,

2002). Baraldi et al. (2012) emphasize that studying such developments is important, and highlight the relevance of empirical research aiming to evolve theories by studying resource development as a phenomenon.

Economizing on resources is viewed as the process of developing resources and their ties to gain particular economic outcomes. In this section, a framework for analyzing changes in the resource dimension of a network is provided, in order to understand how firms economize on supply network development in the resource dimension. This is achieved by discussing relevant theoretical concepts that can be the basis for this framework.

Resources in industrial networks

A resource is *"a relation between its provision and use"* (Holmen, 2001:148; Håkansson and Snehota, 1995). Håkansson et al. (2009) suggest six propositions through which resources are viewed from the perspective of the industrial network approach, and these propositions form the basic picture of how a resource is understood in this study. First, the value of a resource is not defined solely by analyzing its characteristics. Rather, it is a matter of to which other resources the focal resource is connected. Second, the characteristics of resources change; at each point in time, the possibilities a resource has for being used in different ways depends on its history and the types of changes the resource has been subject to in the past. Third, every resource is a part of multiple resource combinations. The embeddedness of a resource is not limited to the resource layer; every resource is a part of a multidimensional context. Fourth, when a resource is changed, tensions are produced, because every resource is related to multiple other resources. Tensions provide both costs and opportunities for the firms involved. Fifth, the way each change affects the resources in focus depends on the intensity of the interaction leading to the change. Finally, the broadness of the interaction defines the extent of the impacts of the change.

According to Holmen (2001), the way resources are viewed in the industrial network approach shares its roots with the ideas of Penrose (1959) as the resource-based view of the firm. The resource-based view assumes that firms are "islands of team production," within which resources are heterogeneous and interact with positive effects (Penrose, 1959; Alchian and Demsetz, 1972). In the industrial network approach, however, firm boundaries are considered to be blurred, meaning that resource heterogeneity expands across firm boundaries. Instead of focusing on the importance of ownership of resources within a firm's boundaries to create benefits, the industrial network approach emphasizes having access to resources and being able to influence them to different degrees in the network (Holmen, 2001). Resource heterogeneity is the most important basic assumption for the resource dimension of the industrial network approach (Håkansson et al., 2009), and, consequently, the value of a resource in the industrial network approach is defined by the other resources with which it is combined (Håkansson and Waluszewski, 2002).

As described and illustrated in Figure 2-1 resources in an industrial network can be analyzed on different levels (Håkansson and Snehota, 1995; Holmen, 2001; Gadde et al., 2010). On the firm level, each firm consists of an idiosyncratic mix of many tangible and intangible resources, which is called a resource collection. On the relationship level, resource ties define the resource dimension of the content of every relationship. Resource ties include the resources on both sides of the relational dyad and the relations between those resources that are specific to the two parties. On the network level, the connectedness among resources goes further than individual resource

ties. Resource ties are interconnected across multiple firms and relationships, and this creates interconnectedness between resource collections, which in turn creates resource constellations. When viewing the resource layer of the network, the structure in which resources are related to one another across the network is called its resource constellation.

According to Holmen (2001), and in line with the propositions above, the value of a resource is never considered as fixed in the industrial network approach. Instead, a resource is valued to the extent that it can be combined with other resources in the resource constellation, and the value of the resource collection of a firm is defined by the embeddedness of that resource collection (in other words, the individual resources it involves, and the ties between them) in the resource constellation. Over time, resources and their relations can be developed (or new resources can be created) to provide higher value. A resource may have similar or different contexts of provision and use, and every resource is directly or indirectly tied to multiple other resources in the network.

Combining resources involves intense interaction between actors controlling the combined resources (Håkansson and Waluszewski, 2002). Creating, developing, exchanging, and using resources are all included in the term resource-combining (Cantù et al., 2012). No resource alone has any potential for reaping economic value. The potential of each resource for being combined and integrated with other resources show how much economic value can be potentially generated by it (Håkansson and Harrison, 2006). If a user perspective is taken on understanding resource-combining, it would be understood as interfacing new resources with pre-existing resource constellations. This implies viewing resource combinations as *solutions* to the user's problems. A solution is *"a combination of resources that has a meaning for an actor in the sense that the actor perceives it to serve some purposes. The solution is instrumental in solving a problem or achieving a desired goal"*(Cantù et al., 2012:140).

Each resource is combined with multiple other resources, and has multiple potentials that are not all necessarily explored at each given time. It is through different combinations of each resource with other resources that those potentials are explored. Combining a resource in a certain way with a given set of other resources may explore some of those potentials, yet leave the other potentials unused. Those potentials are in turn opportunities for resource development. Therefore, the way resources are combined with each other defines what can be achieved from their combination, but also impacts the ways that each of the resources can be developed in the future (Holmen, 2001). This view of resources implies that resources are not only conditions for economic processes, but also products of those processes (Gadde et al., 2003).

Developing solutions to different technical problems is a matter of interfacing resources. Araujo et al. (1999) outlined four buyer-supplier relationship interfaces – namely, standardized interfaces, interactive interfaces, specified interfaces, and translated interfaces. Araujo et al.'s interfaces show how buyers and suppliers relate their own resource contexts to each other's resource contexts, and how interfacing of the resources of a buyer and a supplier lead to productivity and innovativity in the buyer-supplier relationship. In the present study, the interfaces model is used in terms of resource interfaces, in order to analyze developments in the resource layer of a firm's supply network.

Standardized interfaces in a relationship imply that there is no need to relate resources of the buyer and the supplier to each other. For example, the products exchanged can be standardized without either of the parties knowing anything about the other's context. The need for investments of the parties in adaptation of their resource contexts to each other is limited to transaction-related information. In many ways, interactive interfaces constitute the polar opposite to standardized interfaces, and imply that buyer and supplier adapt the resources to each other through interaction. Possibilities for utilizing a resource in relation to the other resources of the buyer and the supplier are created through joint adaptation of the focal resources with the use and production contexts. Interaction enables both buyer and supplier to understand the resource context of the other party.

Specified and translated interfaces typically involve some degree of customization, and such customization implies that the resources of buyer and supplier need to become related to each other. However, the direction of the adaptation is one-sided with specified and translated interfaces. Through specified interfaces, the buying company provides the supplier with specifications and directions, so that the supplier merely executes a given set of tasks on behalf of the buyer. These tasks typically include specifications regarding the product and/or how it is to be manufactured. However, through translated interfaces the specifications that the buyer provides to the supplier are limited to functional requirements, and the supplier is responsible for translating these functional characteristics into a product. In doing so, the supplier is free to carry out the task in the manner that best exploits its existing resources and capabilities.

Hence, it can be argued, with considerations for simplification, that through a specified interface, the supplier primarily adapts its resource context to the buyer, while in a translated interface, it is the buyer that adapts its resource context to the supplier. Both specified and translated interfaces imply possibilities and limitations for economizing in the relationship. With a translated interface, the supplier has the possibility to utilize the focal resource more efficiently, because it can utilize the resource more freely in relation to its other resources. However, a translated interface requires additional investments in the adaptation of the rest of the buying firm's resources to the resource in focus. With a specific interface, the buying firm's use of the resource is limited to a lesser extent by the supplier's resource context, but it is more difficult for the supplier to utilize the resource efficiently in relation to its other resources and the relationships that access the focal resource.

The core difference among the four interfaces lies in the adaptation of the resource contexts of the buyer and the supplier; that is, the use and production contexts of a resource, respectively. Hessel and Najafi (2014) show how different economic logics underlie the different forms of adaptation of the use and production contexts of a resource. In that conceptualization, interfaces that require less adaptation of the use and production contexts, or those that entail more one-sided adaptations of the use or production contexts are better suited to generate economies of scale and scope. Economies of innovation emerge from more interactive interfaces, and situations where translated interfaces enable supplier innovation.

Capacity utilization and versatility of resources

All parties involved in the development and changing of a resource constellation can expect economic consequences (Håkansson and Waluszewski, 2002). The firms' efforts in realizing different economic consequences based on development of their resources are termed economizing on resources. Cantú et al. (2012) analyze the evolution of the actor and resource dimensions of an

industrial network, and suggest that a resource combination can be a different solution for each actor involved, in which all actors involved provide and use the resources. Solutions in terms of new resource combinations, rather than being predetermined, emerge from the way the involved actors interact.

A large part of the resources firms utilize and develop are owned by their suppliers and customers. Therefore, a firm's success is considered to be dependent on gaining access to different types of external resources (Gadde and Persson, 2004). Consequently, customers and suppliers can create value for each other by granting their counterparts access to their resources, developing their resource collections, and contributing to the development of their resource constellations. That being achieved, the key issue that each party would need to deal with is *"how to economically use the potential that exists in each counterpart through resource interaction"* (Håkansson et al., 2009:72).

Resource combining causes tension among resources, which affects the use of the resources involved. These tensions incur costs for the parties that control, influence, or have access to the resources involved. According to Håkansson et al. (2009), such costs arise for various reasons. First, developing a resource for better use can conflict with how it needs to be developed for ease of manufacture. Second, what makes a resource useful for one party may be different than what makes it useful for another. Third, even if a resource is well-adapted to fit a supplier and a customer, the adaptation may be problematic for other parties that access the resource or relate to it in other ways. Håkansson et al. (2009) indicate that the economic consequences of the tensions created by resource interaction are not limited to costs, but can also provide several opportunities for the parties that in some way are related to the resources being developed. Those opportunities may involve better utilizing the capacity of the resource, finding new possibilities of use for the resource, or making the resource fit better with the use and/or production contexts for increased efficiency and effectiveness. Resource interaction over time can even be a source for learning, stimulating future resource adaptations in resource collections or constellations.

Holmen (2001) posited that resources are valuated by their *known use*, and suggested that the *potential use* of a resource can be the basis for resource valuation. Therefore, economizing on resources in supply network development would seem to be about exploring the potential use and value of a resource constellation being developed. This is accomplished by developing resource constellations to achieve different economies. Any resource development process can be described by discussing, on the one hand, the weight of investments dedicated to developing the resource and adapting it with other resources in the resource constellation, and on the other hand, the variety in the use of the focal resource in relation to the other resources – that is, the number of other resources the focal resource is related to (Håkansson et al., 2009).

In order to analyze the utilization of the capacity of a resource, the concept of *capacity indivisibility* can be used. Capacity indivisibility is a quantitative measure (such as production volume or man-hours), and emphasizes that each resource can only be accessed within certain "capacity intervals" (Holmen, 2001). When a resource is utilized in long or frequent capacity intervals for a certain activity, it can be considered to have high capacity indivisibility. Economies of scale can be achieved through increased employment of a resource, by utilizing it in longer or more frequent capacity intervals. If the intervals during which a single resource is utilized for a number of

activities constitute a large part of the capacity of that resource, that resource can also be said to have high capacity indivisibility. This can be the basis for achieving economies of scope in the utilization of a resource. Therefore, when analyzing how supply network development can be achieved by economizing on scale and scope, studying capacity indivisibility of the resources in the resource constellation in focus can be useful.

A resource can be used in different ways, and developing a resource may entail changing the ways it is used and finding new ways of using or producing it. Holmen (2001) coined the concept of *resource versatility* to describe this feature of resources. A highly versatile resource is a resource that can be used in various ways and contexts, while a resource with limited versatility is a resource that cannot serve a wide scope of settings. Versatility of resources can be achieved through exploring either their combination potentials or their modification potentials. However, exploring even "all" potentials of a resource will not result in optimal efficiency or effectiveness in its use, because over time the resources related to the focal resource develop, and the potentials constantly and endlessly change (Håkansson et al., 2009). Hence, the combination and modification potentials of a resource are infinite (Holmen, 2001).

When exploring the combination potentials of resources, the potentials are assumed to be infinite, but bounded. This means that for two resources, an infinite number of beneficial combinations of each with other resources may be possible, but those possibilities for one of the two can be more or fewer than the possibilities for the other (Holmen, 2001). Exploring combination potentials for a resource requires interactions with counterparts in the network. Interactions include combining resources controlled by different actors to achieve different economic benefits. Interactions cannot be unilaterally controlled by one of the parties involved; instead, they require the participation of all involved parties (Håkansson et al., 2009). Exploring combination potentials can create value by fitting the use of a resource into the specific resource combinations of its use context (Lavie, 2006). Economic benefits can also be achieved through development of the use of a resource by adjusting to its provision in the production context (Holmen, 2001), and this *use development* is the primary function of firms (Snehota, 1990).

Versatility due to modification potential is also subject to bounded infinity. There are infinite ways to modify a resource, in other words, changing its components and settings in order to serve in new ways. Modifications can take place all the way down to the complete decomposition of the resource, resulting in its annihilation. Hence, the total number of modifications that can make sense for the resource still to work as a whole are restricted.

Economies of innovation involve solving problems of different types, as well as learning that results in avoiding potential problems. The concept of versatility can be used to understand how the development of resources and their interactions can result in economizing on innovation in supply network development. Learning and solving problems of different types – and changing the way a resource is utilized – entails development of resources related to that problem. According to Håkansson and Snehota (1995), the process of developing a resource is not a linear one; it can have ups and downs, and may not result in improving all features and functionalities of the resource. However, for every resource there always exist potentials for development in the network, by modifying the features of the resource or combining it with different resources in the network (ibid.). In that sense, opportunities to access the resources of counterparts in the network

play a vital role for firms aiming at fostering technological solutions and developing their resources (Gadde et al., 2012).

2.4.3 DEVELOPING THE NETWORK IN THE ACTOR LAYER

By employing a network perspective, an actor is understood in relation to the network; the definition of actors is therefore cast in terms of *"the resources they have been able to mobilize and the activities in which they are involved"* (Gadde et al., 2003:362). Håkansson and Ford (2002) analyze industrial networks using a graphs metaphor, involving nodes and threads. In their conceptualization, *"a node is directly related to the existence of threads. The content of the threads is the result of investments by both of the counterparts. […] The development of the threads is an outcome of investments in both the nodes as well as in the threads themselves"* (ibid.:134). Hence, the content of a relationship is dependent on how it is developed by the actors involved in it, and development of relationships not only provides opportunities, but at the same time imposes restrictions on the actors involved (ibid.).

There is no way for a company to be able to make a development in industrial networks except through the network. The firm needs to work with the expectations of the other members of the network, and find ways to contribute to the direction of the developments, in such a way that the benefits of the development and the activities and resources within the firm and across its relationships are aligned (Håkansson and Ford, 2002). Therefore, for every firm to decide on how to affect developments in the network surrounding it, it is important to understand the possible benefits of each development, and how each development affects its activity links, resource ties, and actor bonds.

At the same time, no actor can solely direct changes and developments to align to its benefits. Even in situations where power seems extremely unbalanced in a relationship, neither side can unilaterally develop the relationship (Håkansson and Ford, 2002). According to Håkansson et al. (2009), the attributes and identity of an actor are different in each of its relationships, and change over time. No actor evolves autonomously in isolation, but actors evolve together with the other actors in their small worlds, and they also affect the evolution of others in their wider worlds. Each actor predicts certain outcomes for each of its actions, but since those actions affect the other actors, those predictions can be completely wrong. Hence, achieving tangible outcomes is not necessarily dependent on an individual actor's instrumental motives and intent. According to Baraldi and Strömsten (2009), the creation and use of value in industrial networks cannot be limited to a specific actor; it requires certain configurations in the network, and therefore involves actors across the whole network. Hence, studying the development of supply networks requires careful probing of how economic sense can be made of what happens in the actor dimension.

Actors in industrial networks

Research in the IMP tradition indicates that actors need to be conceptualized with an interaction approach (Håkansson et al., 2009). In this perspective, an actor is viewed as *"someone or something that develops an identity within a complicated pattern of evolutionary development […] the actor develops its combination of activities and resources interactively with the activities and resources of other actors"* (ibid.:137). Actors are interdependent, and each actor is viewed (and its behavior is interpreted) from the viewpoint of each counterpart in a unique way. The behaviors of any two actors interact, and through this interaction, the outcome of their behaviors is defined

for each counterpart. Hence, no actor has full control over the outcomes of its behavior. The way a firm relates to its counterparts in both direct and indirect relationships, and the way it is viewed by the other counterparts, will define what it can achieve and how much economic value it can create (Håkansson et al., 2009).

Through interaction over time, interdependence grows among actors, and a web of actors arises that embodies activity links and resource ties in relation to those actors. Interaction among actors blurs the boundaries of each actor, and makes it difficult to separate itself from the others. Actors combine resources and link activities, they earn and produce knowledge about what can be achieved from different combinations of resources, and they identify problems and try to find solutions for them by recombining resources (Håkansson et al., 2009).

In industrial networks, not only does change take place exclusively through the network, but the development of relationships also goes hand in hand with the development of the actors involved. According to Håkansson and Ford (2002:136), *"developing a node always involves developing its threads and a thread cannot be developed without affecting the nodes to which it is linked."* Hence, for every company having counterparts with which they can cooperate, developing the relationships with them will be important and relate to the existence and identity of the company.

According to Håkansson, et al. (2009), whenever the actors involved in a relationship feel the need for a change in the relationship in order to deal with a certain problem, they develop the relationship further. Such problems are specific to the actor and relationship, and so are the solutions developed for them; each side of a relationship makes sense of the value of the solution (the development in the relationship) differently. The way each actor views each problem and solution depends on the experiences the actor has had in previous encounters, the types of other relationships the actor is involved in, and how the actor views the network. Hence, each actor needs to relate its activities and resources to those of other actors in the network in a way that makes sense in solving its own problems. This creates bonds between actors.

Håkansson and Ford (2002) show the importance of taking into account the dynamics of the network by considering not only the actions of the actor in focus, but also which actions the other actors in the network might take. The same authors advocate that finding the right strategy for each actor at each point in time depends on the different aspects of the actor's position in the network, and that *"there are no nice and neat solutions or standardized approaches to strategic network success"* (ibid.:138).

A change in the network does not result from a single technology of an actor; different actors in the network develop, synthesize, and apply technologies of different kinds, and this creates the change in the network (Håkansson and Ford, 2002). Innovation and technological development include "bundles" of development and application of a variety of technologies (Ford and Saren, 2001). Multiple actors often provide those technologies, and hence changes such as development of new products are often undertaken within relationships where some investments have already been made, rather than establishing new relationships for the development of each new product. Networks play an important role in innovation; in order for innovation to take place, networks provide the bundle of new and existing technologies across multiple actors (Håkansson and Ford, 2002; Ford and Saren, 1996).

Jointness and co-evolution of actors

The discussions above address two important points. Firstly, strategic action in industrial networks depends on how the actor, the resources it controls, and the activities it undertakes are related to the other actors, resources, and activities in the network – and these conditions change over time for all of the actors, activities and resources involved. Secondly, this results in various opportunities to be explored and restrictions to cope with for each actor at each point in time. Therefore, in order to understand how firms economize in supply network development (or, in other words, the way firms make economic sense of the changes and developments they make and direct in supply networks), the three dimensions of the network (actors, resources, and activities) need to be probed. Håkansson et al.'s (2009) conceptualization of interacting actors with two distinctive features of jointness and co-evolution can help to gain such an understanding.

According to Håkansson et al. (2009:141), *"Jointness is a way of characterizing a specific relationship between any two actors in relation to all others. Jointness is a measure of the spatial extension of an actor across the network via its relationships with others."* Jointness of two actors is defined by their closeness in geographical space, knowledge, technologies, investments, and cultures.

A relationship plays the role of a contact between its two sides – equally for both sides. However, the way it is viewed and understood by, the benefits it provides for, and the restrictions it imposes upon each side are always different. One important reason for this is that each side of the relationship is also involved in a number of other relationships, and those relationships affect the focal one. Each actor connects the relationships it is involved in by handling this interconnectedness, and in this way gains an understanding of each relationship that is unique to its own situation. Likewise, the network holds different meanings when viewed from the viewpoint of each actor (Håkansson and Ford, 2002).

Each actor is active in a small world of its own, which is comprised of the few actors in the network with which the focal actor is in direct relationships, and those relationships play an important role in the actor's business. When two actors establish a relationship between each other, their two small worlds connect to each other through that relationship, and a number of connected relationships appear. How actors interact in supply networks has important consequences not only for those actors, but also for their web of actors, their resource constellations, and their activity patterns (Håkansson et al., 2009).

According to Håkansson et al. (2009), no actor develops or is responsible for the evolution of a network in isolation: It is through the interactions between all actors in the network that the network evolves. The past, the future, and the connections between the past and the future of an actor's relationships in its small world define the *co-evolution* of the network surrounding that actor. The way the future impacts co-evolution is through the expectations of each actor about the developments of the web of actors in the future. These expectations are always limited to the actors' own involvements within their small worlds, and what they know about each other's other relationships.

A resource combination can have different meanings to different actors, because the contexts of those actors differ. In other words, an actor's latitude in the web of actors is important in identifying different solutions as relevant for the actor. The difference in the actors' perceptions

of a resource combination is also related to the fact that any actor is the provider of some resources and the user of some. Hence, each resource combination makes sense to different actors as different solutions. Depending on to what extent and in what way two actors interact, different interfaces are created between their resources. These interfaces are vital for the development of resource combinations as solutions (Cantù et al., 2012).

Joint resource-combining in the network provides opportunities for learning for the counterparts involved. This learning can be a basis for increasing the value of resources by finding better ways for utilizing and combining them. Each actor, by interacting with other actors, gains certain knowledge about the actors, activities and resources in the network surrounding it. Because actors continuously interact, this knowledge constantly develops over time, and leads to the discovery of new opportunities, problems and solutions to those problems. Due to the dependence of the development of this knowledge on interaction with other counterparts in the network, this knowledge is always incomplete, and at all times possibilities exist for further developing it (Håkansson et al., 2009).

2.5 PROBLEM DISCUSSION AND RESEARCH QUESTIONS

Håkansson and Snehota's (1995) scheme for analyzing the development effects of business relationships is the cornerstone of this study's analysis of supply network development. As described earlier in section 2.1, Håkansson and Snehota (1995) suggest that the interplay between activities, resources, and actors drives developments in business relationships. However, the unit of analysis in this study is not the buyer-supplier relationship (as it was in Håkansson and Snehota's (1995) model). This study builds on that model to analyze developments in the supply network of a firm, and from the firm's perspective.

As described in section 2.3, Gadde et al.'s (2010) third perspective regarding supplier relationships highlights three categories of economic benefits that can be reaped by focusing on maximizing interdependence between firms in industrial networks – namely, economies of scale and scope, economies of integration, and economies of innovation. These benefits are the basis for this study's conceptualization of economizing; they are the economic logics that, from a firm's perspective, can explain the firm's taking part in developments in its supply network. To understand how a firm economizes on developments in its supply network, those three economic logics are investigated. In essence, each of the three economic logics represents one way that a development can be understood in terms of how it can make sense to the firm.

The analytical framework presented in section 2.4 offers a toolbox for analyzing how different elements are interrelated in each layer of the network. The aim of the study is approached by developing an understanding of how that interrelatedness changes when developments take place in a firm's supply network, and how those developments make economic sense to the firm. Changes to the interrelatedness of network elements are captured by looking into how activities are adjusted relative to each other, how resources are adapted to each other, and how actors are related to each other. Each development is interpreted as a "change" to the activity, resource, and actor dimensions in terms of adjusting, adapting, and relating them, respectively.

Any development affects various network layers. A change is defined as the part of a development that takes place in one network layer. This is central to the logic of the analysis in this study; each

development is analyzed in terms of changes in one network layer, and pursues its economic consequences in the other network layers. In addition, the network layers have various features. To understand how the firm economizes on each development, six concepts are used, two for each network layer. Each concept describes a feature of a network layer that a change may pursue to improve. Each type of economizing is defined as the economic logic of a change in one layer in relation to the economic consequences that can be achieved in another layer of the network. To analyze each change, two network layers affected by the change are analyzed – one where the change takes place, and another layer in which the economic consequences of the change are realized.

This logic is the basis for understanding changes in the supply network under study with regard to the concepts presented in the analytical framework. In order to use the six concepts for describing the economic consequences for the features of the network layers, the concepts are redefined and adjusted so that they can explain how a change can make economic sense by pursuing improvements in each network layer.

Table 2-1 presents the concepts used for describing changes, and summarizes what is meant by each of the concepts used in the analysis.

Table 2-1: A summary of concepts forming the basis of the analysis

Network layer	Change of interrelatedness	Features to improve
Activities	Adjusting	**Similarity / Diversity** The extent to which the undertaking of two or more activities requires the same resources.
		Sequentiality The extent to which undertaking of an activity depends on undertaking other specific activities.
Resources	Adapting	**Versatility** The extent to which a resource can be modified or combined with and used in relation to other specific resources.
		Capacity utilization The extent to which the capacity of a resource can be utilized over time.
Actors	Relating	**Jointness** The closeness of two actors to each other, as compared to their bonds with other particular actors.
		Co-evolution The extent to which two or more actors evolve in relation to one another over time.

In this model, each change encompasses two network layers; one where the interrelatedness among the network elements changes, and another where the economic consequences of the change are pursued. The three types of economies (Håkansson and Persson, 2004) are redefined as three types of a firm's economizing in its supply network to describe different changes in terms of how the change can make economic sense to the firm. First, economizing on scale and scope is defined as the way that a change encompassing the resource and activity layers makes economic sense.

Second, economizing on integration is defined as the way that a change encompassing the activity and actor layers makes economic sense. Finally, economizing on innovation is defined as the way that a change encompassing the actor and resource layers in the network makes economic sense. Figure 2-2 illustrates this logic.

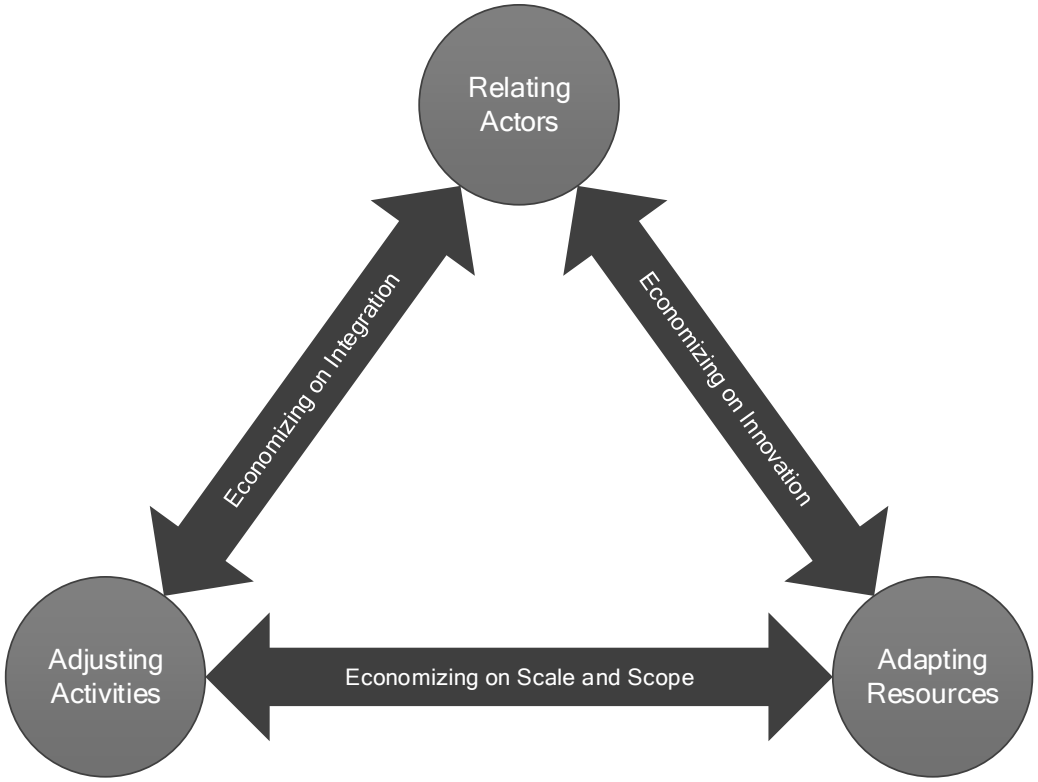


Figure 2-2: The "pair-wise" logic of the analysis of a firm's economizing on developments in its supply network

Accordingly, three research questions are formulated below to problematize the concept of economizing – in the way defined above and in relation to the concepts presented in section 2.4 – for analyzing developments in a firm's supply network. As discussed previously, each development is analytically broken down into changes that encompass multiple layers of the network. The goal of these research questions is to conceptualize the three forms that a change can take to make economic sense. In chapter 6, the research questions are answered by discussing the different ways that changes make economic sense, and can be analyzed in order to understand a firm's economizing on taking part in developments in its supply network.

RQ1. How can changes in the resource and activity layers of a firm's supply network make economic sense?

RQ2. How can changes in the activity and actor layers of a firm's supply network make economic sense?

RQ3. How can changes in the actor and resource layers of a firm's supply network make economic sense?

---

3 Method

In this chapter, the methodological considerations of the study are presented. The study is designed as a qualitative single-case study. Inspired by the systematic combining approach (Dubois and Gadde, 2002), the description of the process of the study is the backbone of this chapter, setting the stage for all other methodological discussions presented in the thesis. The design of this study is also presented with an emphasis on the interaction between the building blocks of the study. Further, interactions of the researcher with the empirical world are also presented in order to clarify where the empirical data used to create the case (chapter 4) comes from. The quality of the study is discussed at the end of this chapter, while in section 7.5, a few implications of applying the method presented below are discussed.

3.1 THE SYSTEMATIC COMBINING PROCESS

The relationship between theory and empirics in this study is best described as a systematic combining and an abductive approach. According to Bryman and Bell (2007), deduction is an approach in which research is conducted using hypothesis and ideas inferred from theory, while in induction, theory is a result of research. Hence, deduction is a process in which observations and findings are used to verify theories, whereas in an inductive approach observations and findings determine theoretical choices. Miles and Huberman (1994) suggest that a tight and pre-structured approach (as deduction) to framework development heightens the risks of missing important features of the case by misinterpreting the perceptions of informants due to the need to fit data within the predefined theoretical frame. On the contrary, a loose and emergent approach (as induction) in case research is vulnerable to *"indiscriminate data collection and data overload"* (ibid.:17).

Dubois and Gadde (2014) indicate that case research needs tightness to support the preconceptions of the researcher, and evolution to make use of the new directions that emerge along the theoretical and empirical journeys of the researcher. Hence, they propose a *tight and evolving* approach that is in better accord with an *abductive* view of the relationship between theory and empirics. Based on this approach, Dubois and Gadde (2002:554) formulate *systematic combining* as a process where *"theoretical framework, empirical fieldwork, and case analysis evolve simultaneously."* The constant evolution of the researcher's framings of the theoretical and empirical worlds facilitates theory-building. This is done through the two processes of *matching* and *redirection*.

Figure 3-1 illustrates the interaction between theory and empirics in systematic combining. In this process, the case researcher recurrently redirects its focus in the theoretical and empirical worlds. The reason for this is that interacting with the empirical world reveals new aspects that the researcher may find relevant and interesting for the casing and case analysis processes. However, discovery is not limited to the empirical journey; the researcher's exploration of theoretical concepts for addressing the empirical observations may also lead to discoveries that would redirect empirical investigation. Simultaneously, the researcher is involved in matching the design of the case and the framing of the analytical toolbox. The framework and the case are developed in parallel; the case is to illustrate the theoretical view with which the researcher illustrates the world, and the framework helps guide the analysis of what the researcher interprets and presents as a case of a phenomenon. During the matching process, the researcher shapes the structure and content of

the analytical framework and the empirical story by moving back and forth between them on multiple occasions, making empirical discoveries and trying new analytical ideas on them.

The current study is based on this methodological approach; during the process of this study, the empirical and theoretical investigations have moved forward hand-in-hand, and the framework and the case have been developed in parallel through multiple iterations. Some of the iterations have caused minor changes to the structure and content of the case and framework, while others have resulted in major revisions of the framework and thus of the subsequent selection of data. Even the primary phenomenon under scrutiny has been reconsidered during the study.

The sub-sections below include a description of those major changes that have been pivotal in the evolution of this study into its current form. The following four sub-sections cover the six states that the study has gone through. The first sub-section covers three states starting from my master thesis and ending with my licentiate thesis. The sub-sections 3.1.2, 3.1.3, and 3.1.4 elaborate on the matching and redirections that have taken place after the publication of my licentiate thesis.

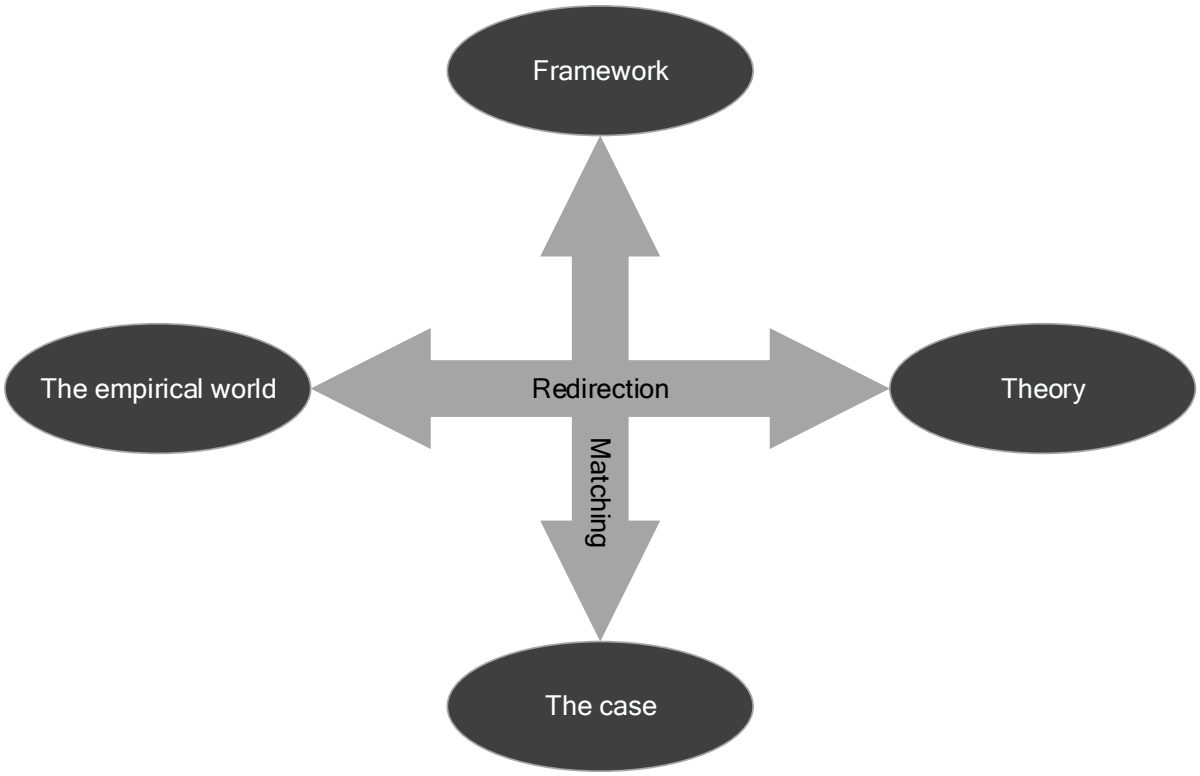


Figure 3-1: Systematic combining (adapted from Dubois and Gadde (2002))

3.1.1 FROM ACTIVITY-MOVING TO SUPPLIER BASE INITIATION AND DEVELOPMENT

This study started in 2009 with a smaller-scale pre-study with a focus on low-cost country sourcing. At that time, I studied three cases of firms establishing or expanding relationships with suppliers in low-cost countries, seeking to understand those international supplier relationships as investments. One of the three cases was FlexLink's sourcing in China, which became the starting point for the single-case design of the current study. The main motivation for this choice was what I observed about FlexLink's approach to China sourcing: a holistic approach taking into account multiple supplier relationships at the same time, a long-term perspective, and a general emphasis on collaboration in the firm's supplier relationships. This made it possible for me to highlight

network interdependencies in FlexLink's China sourcing efforts instead of seeing its efforts as what is conventionally understood as a reliance on low direct costs, and view the case as one characterized by moving activities across boundaries of firms and countries. The framework was then refocused on activity interdependencies, in order to capture the network effects of such moving of activities.

The formulation of the phenomenon as investments in international supplier relationships was inspired mainly by the gradual and cautious nature of FlexLink's establishment and expansion of China sourcing. During the process, additional data was collected that complemented that image; it seemed that FlexLink's relationships were subject to various ups and downs in different dimensions, and each fluctuation could be associated with a certain (not necessarily positive) outcome. FlexLink's approach to China sourcing involved establishing a new supplier base with a handful of suppliers, enabling the firm to ensure close relationships with the suppliers and meet its demands for high product quality. Some of those suppliers were recently established, but FlexLink did not see its inexperience as a disadvantage; FlexLink wanted to grow in China together with those suppliers.

At that point in time, the phenomenon under study became initiation and development of a supplier base. In the case, I attempted to illustrate the process of FlexLink's start in China sourcing and then its gradual development of the supplier base there. The focus of the framework became the initiation and changes in the characteristics of those supplier relationships over time, in order to grasp the economic consequences of those changes. This was primarily inspired by the concept of "economies" I first read about in Gadde et al. (2010). Because the concept presented a general classification of economic benefits, I found it very suitable to describe the economic consequences of the changes.

Later, I came across another relevant use of the same concept; namely, Håkansson and Persson's (2004) use of the three types of economies as three main logics behind supply chains and networks. At that point, I combined the economizing concepts with Gadde and Snehota's (2000) model for analyzing involvement in buyer-supplier relationships[2] to form my framework. The framework was therefore designed to grasp the economic benefits of each change, by analyzing several factors – changes in the level of involvement in each relationship in the supplier base, changes in the activity interdependencies within relationships, and the ways the buying and selling firms collaborate in their relationships.

In addition, the process of FlexLink linking its supplier base in China with the rest of its globally situated supply network was briefly addressed. The reason for this was that although I intended to analytically delimit my empirical investigation to the development of FlexLink's supplier base in China, numerous connections to the rest of the network that were identified during data collection proved difficult to ignore. The aim at that point was to explore the initiation and development of a supplier base in a new context – from the perspective of a firm – but the connections with the rest of the network were calling for a more holistic approach to the problem of developing the supply network. In the conclusion to my licentiate thesis, that need for a more holistic approach emerged as the most critical implication for future research. Figure 3-2 illustrates the change of the

[2] Involvement, according to Gadde and Snehota (2000), is defined by the extent to which actors interact, resources are adapted, and activities are coordinated.

phenomenon focused on in my study, starting from its earliest phases until the time I defended my licentiate thesis.

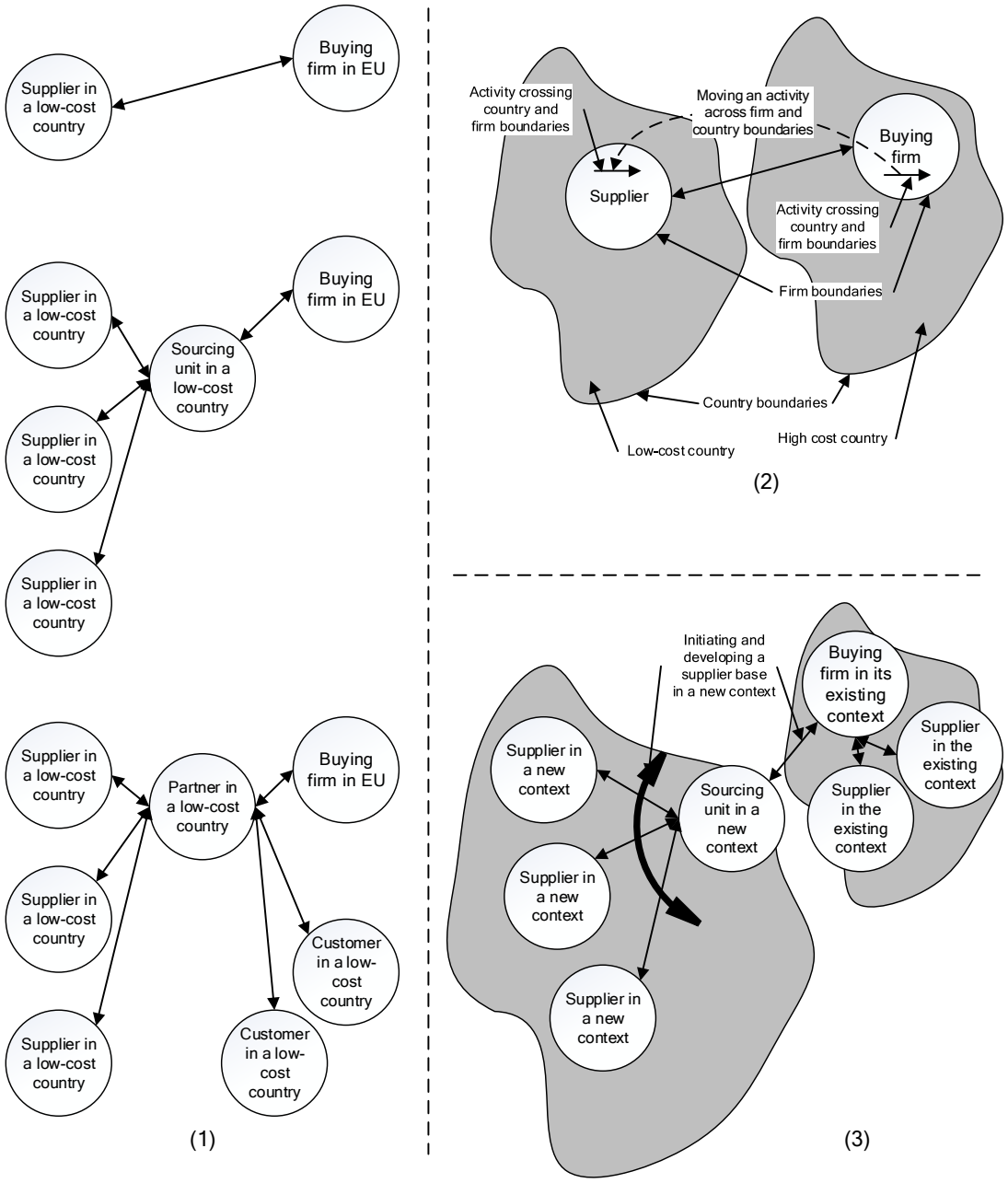


Figure 3-2: The phenomenon under study in the first three states: Investments in international supplier relationships, activity-moving, and initiating and developing a supplier base

At the end of that phase, the difference between supplier base development and supply network development I intended to highlight concerned the scope of the focal firm's developments. With the supplier base perspective, I was mainly interested in investigating FlexLink's supplier base in China from its outset. The establishment of relationships with the suppliers in China and creating a well-preserved, collaborative supplier relationship atmosphere through FlexLink's China Sourcing unit was central to the formulation of the phenomenon, the case design, and the framing of the analytical toolbox. One result of that investigation was my initial attempts to work with the concept of economies, and that opened a new door. I could see more potentials in developing the concept to capture a more holistic phenomenon. In the phases described below, I managed to take

advantage of those potentials to gain an understanding of the economic nature of developments in a more principal way.

3.1.2 THE QUEST FOR ECONOMIC CONSEQUENCES AND ANTECEDENTS

Additional empirical data that were collected in that period played a key role in setting a new analytical direction. During the data collection, I realized that FlexLink's relationships in China had expanded dramatically, and that had changed the functionality of its China sourcing as a whole: The supplier relationships in China had become more important in FlexLink's supply network, and that meant that, in line with the conclusions in my licentiate thesis, I needed to look beyond the Chinese supplier base, and look into the developments in FlexLink's supply network as a whole.

In parallel, the framework also seemed somewhat problematic; at that point, I realized that the framework was more of a suggestion of a few aspects to cover when analyzing supplier-base initiation and development, rather than principal analytical elements that could help expand understanding of the nature of developments in supply networks. A first step was to revisit the concepts used in the framework. The concept of collaboration types proved suitable for exploration of the phenomenon, but it was not suitable for the continuation of the study, for two reasons. First, it was not sufficiently conceptualized, and therefore was difficult to use it in an empirical context. Second, Gadde et al. (2010) propose that each type of collaboration with suppliers can result in achieving one of the types of economies. This one-to-one relationship between the types of collaboration and economies reduced the explanatory power of the concept when it was employed for conceptualizing economizing and economic benefits. The problem was that empirically recognizing a specific collaboration type in a relationship was difficult and too arbitrary; it would directly point at achieving one certain type of economizing, without providing sufficient depth to allow empirical analysis.

Excluding the collaboration types from the framework made me realize that I was overemphasizing the activity dimension in my framework. In parallel, I heard for the first time about FlexLink's relationship with a supplier[3] that initially sold only standardized items to FlexLink. When discussing the development of that relationship over time, I realized that some important changes could be described more properly using the interfaces concept (Araujo et al., 1999). This was an exciting turning point, because this way I could expand my framework to cover a more detailed analysis of not only the activity dimension of FlexLink's supply network, but also its resource dimension.

The initial analysis showed that the change of resource interfaces in a relationship (from "standardized" to "translated," in the case of FlexLink's relationship with that supplier) can explain certain features of the economic consequences of the development in terms of "productivity" and "innovativity." This created a redirection in the empirical investigation to collect more thorough data on developments in FlexLink's supply network in the resource layer. Specifically, I became interested to find out what each development had meant for the resources of the firms involved, and I hoped to be able to explain their economic consequences using resource interfaces as a key concept.

[3] The supplier is called SS3, and the relationship will be described in chapter 4.

Still, I needed more detailed information regarding the economic aspects of developments. Therefore, I also devoted considerable discussion time during interviews to value creation in FlexLink's supplier relationships. The intention here was to determine what type of value and economic outcome FlexLink envisioned in making different changes in its supply network, and this led to a variety of new economic benefits I had not come across before. Furthermore, this gave me an opportunity to understand in far greater detail what each development had produced in terms of consequences.

I needed an aim that could encompass the new link I could see, the link between a variety of economic benefits and the way each development is approached by the buying firm. Therefore, it became important to understand both what is expected of each development and what is actually achieved by it. The aim then focused on understanding *economic consequences and antecedents* of developments in a firm's supply network.

In order to convey a deeper understanding of how economic antecedents and consequences of developments relate to each other, the case was structured in terms of four points in time – each of which would represent the structure of FlexLink's supply network at a certain point in time. The choice of points in time was based on key events that had major impacts upon the settings of the focal supply network. The idea was to structure and analyze the case in line with what Van de Ven and Poole (2005) established for observing differences in an organizational entity (here, FlexLink's supply network) between two points in time. Hence, the phenomenon under study became developments in the structure of a firm's supply network. Figure 3-3 illustrates the phenomenon during that phase of the study.

Two research questions were defined in accordance with that approach: one to understand economizing on supply network development from a structural viewpoint, and the other to explain the processual characteristics of economizing on supply network development. This was primarily inspired by Håkansson et al.'s (2009) presentation of network concepts in a space/time divide. The first research question intended to explore economizing in *space*, and sought to link economic antecedents and the consequences of supply network developments in each structural snapshot. The second research question intended to develop an understanding of the *time* dimension of economizing on supply network development, by analyzing the observed differences between consecutive points in time in the case. As a result of the developments discussed above, the framework I intended to use for my space and time analyses had three cornerstones – *involvement*, *interdependencies*, and *interfaces*. However, that analysis was left unfinished due to several problems that made it not only difficult, but also, to some extent, not very useful.

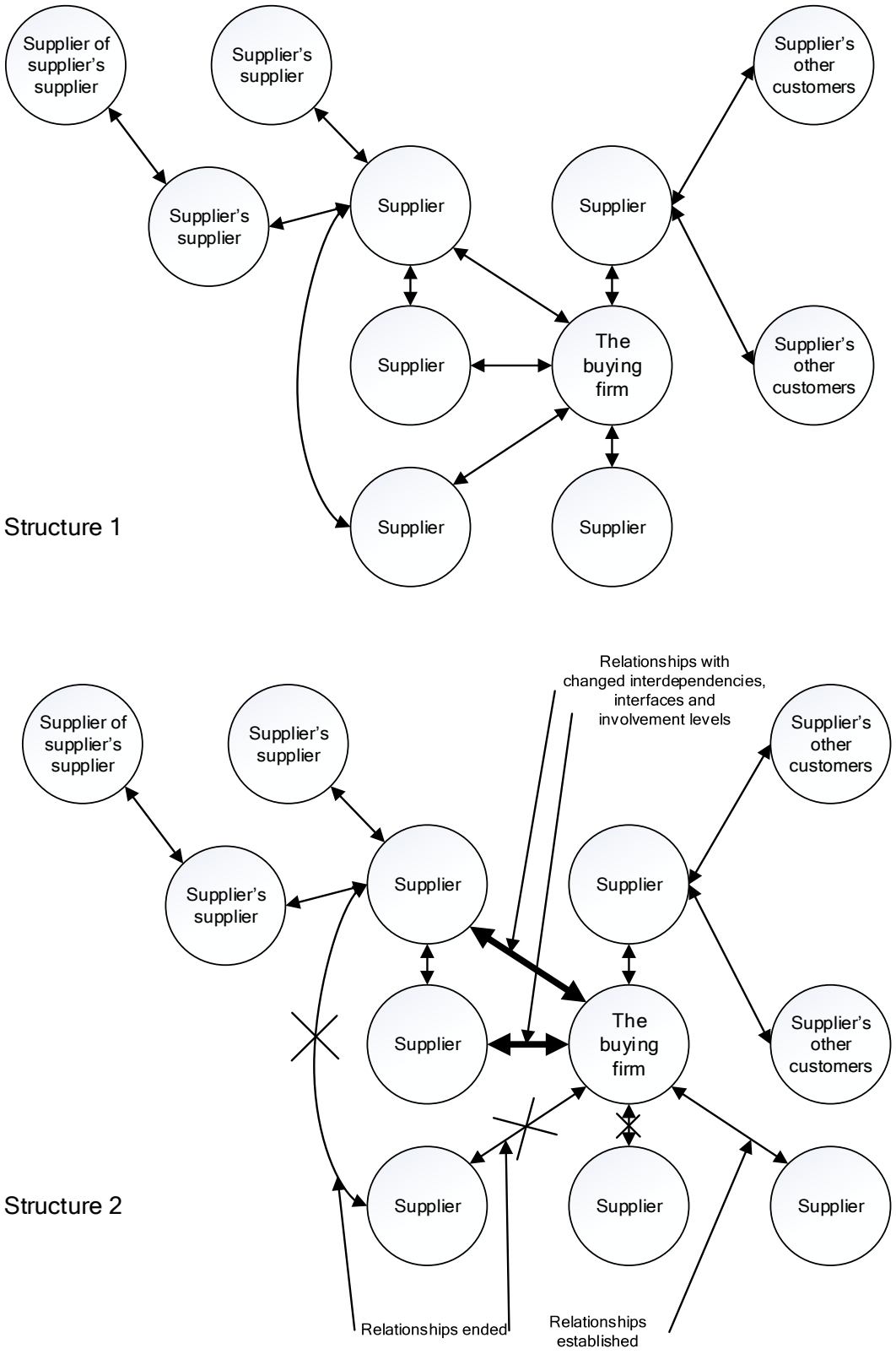


Figure 3-3: The phenomenon under study in the fourth state: Developments in the structure of a firm's supply network

3.1.3 ECONOMIZING AS ECONOMIC SENSE-MAKING

In parallel to the development of the above-mentioned framework, during my interviews I came across another interesting story. This was the story of the major problems encountered in the relationship between FlexLink and a supplier in China, and the process of that relationship shrinking at the same time as the expansion of a relationship recently established with another

supplier in China[4]. The former supplier had outsourced all of FlexLink's pin production to a sub-supplier, without FlexLink's knowledge. FlexLink took advantage of the problems in that relationship to start a relationship with a supplier with whom FlexLink felt it could have closer collaboration. FlexLink needed a supplier that it could work closely with for development, cost-cutting, and improved planning opportunities, and the remote dysfunctional link with the sub-supplier proved that the former supplier was not capable of providing those benefits for FlexLink.

At this point, it had become difficult to structure the case so that it would successfully address the research questions discussed earlier. The case was mostly about developments, and all developments take place over time. It was not possible to draw snapshots without oversimplifying and running the risk of making a case less useful. One option was to rearrange the empirical description in order to gather more space-related and less dynamics-oriented data; however, that would have meant performing only a structural analysis, which would not capture the dynamic nature of developments. In order to understand the developments, I needed data that could show me how developments are made in the supply network over time.

Another problem I had faced during the earlier phases of the study (as in the period discussed in section 3.1.1) was that I had not satisfactorily defined the concept "economies of" in terms of their relationship with developments in a firm's supply network. A question I had never managed to answer was: Are economies intentions or consequences? At this stage, I realized that I could ask that question in a different way: Are economies what firms purposefully pursue, or are they characteristics of developments? In line with that change of focus, I decided to work specifically with the word "economizing," rather than "economies of." This was to highlight the dynamic nature of developments firms make in their supply networks in pursuit of different economic rationales.

In order to answer that question, I needed to get back to the empirical world and find inspiration. I collected more information regarding the content of interactions and relational atmosphere in the supplier relationships under study. The initial analysis of that additional data revealed a need for an analytical tool to grasp the economic aspects of different interactions. I realized that if I intended to develop a framework capable of analyzing a firm's supply network developments, that framework needs to capture a development in all three network layers – of actors, resources, and activities. Therefore, I expanded my empirical investigation by placing an emphasis on questions intended to illuminate changes in the content of FlexLink's relationships in terms of actors, resources, and activities, as well as changes that mobilize connectedness of multiple relationships. The question was, what happens in each network dimension when different developments are made? In other words, I was looking for signs of each development within each of the network layers. Actors, resources, and activities are interconnected, so I needed a set of analytical tools that would facilitate analysis of the network layers to reveal more about changes in them.

The analysis structure occupied three levels. The first level was designed to capture developments on a relational level, to conceptualize economizing in order to understand the developments that take place within relationships. The intent behind the second level was to capture developments across multiple connected relationships, and the third level was an attempt to grasp developments

[4] The former supplier is called MS4, and the latter is called MS7. The story is elaborated in chapter 4.

of FlexLink's supply network as a whole. The main idea, which was motivated by the empirical findings, was that developments in each level are principally different from developments in the other levels. This was empirically motivated; I observed that the job of connecting relationships is a complicated task, which can be used to differentiate inter-relational developments from the dyadic ones.

Already a problem had surfaced here: How could a development be analyzed by looking only into one network layer, and disregarding what happens in the other layers? An analysis conducted in that way seemed too difficult and perhaps even meaningless, because the possible final outcome of such analysis was too unclear. This was primarily because the theoretical tools that were framed at that stage could not be used to analyze developments in each network layer and relate them in some way to economic sense-making. Therefore, I continued searching for more suitable tools, but the more relevant were the tools I found, the less relevant became the analytical logic based on analyzing changes in each network layer individually. The tools I had found that could properly be used to analyze my empirical observations were all suitable for single layer analysis, but the links they would help me establish between the characteristics of developments in the supply network and their economizing potentials pointed at more than one network layer.

At that point, my initial analysis resulted in an early formulation of the triangle presented in the problem discussion (section 2.5). Figure 2-2 (on page 29) uses the logic of economies to link developments in different network layers to each other. In other words, as an answer to the key question raised in the beginning of this sub-section regarding what economies entail, I found an important functionality for each of the types of economies (scale and scope, integration, and innovation); they became the economic logics underlying the developments that emphasize changes in a certain network layer. This allowed me to structure the case as a story of developments in FlexLink's supply network in three distinct time periods in the history of the network, and the analysis to capture developments within each time period and within each of four (or five) technology areas. Each time period was selected based on major events and important turning points with regard to the analysis and the story of FlexLink's supply network development in the case. Hence, the phenomenon under study became a firm's developments in its supplier relationships and connected relationships (see Figure 3-4).

This new way of understanding economizing was mainly inspired by a few attempts I made to problematize supply network development. At that point I had realized that despite the vast application of the economizing concept in transaction cost economics, it seemed to me that it was inappropriate to use it for studying this particular phenomenon. Instead, Weick's (1995) concept of sense-making seemed far more relevant to what I meant by economizing, which could best be described as *"economic sense-making."* This, supported by Weick's conceptualization of sense-making, could properly encompass the logic behind developments and be used as a concept to understand developments in supply networks.

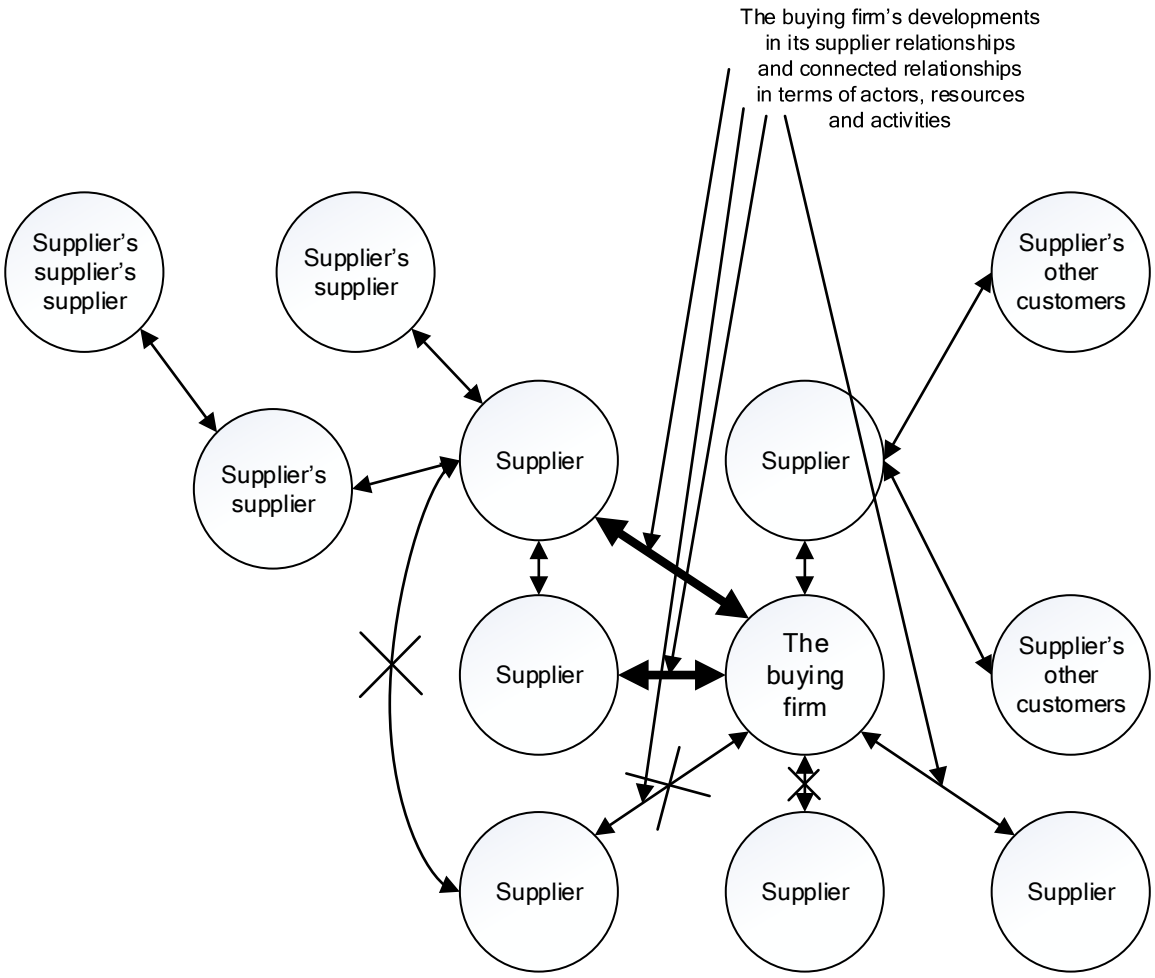


Figure 3-4: The phenomenon under study in the fifth state: A firm's developments in its supplier relationships and connected relationships

3.1.4 ECONOMIZING AS MAKING SENSE OF DEVELOPING IN INTERACTION

By the time I decided to define economizing as economic sense-making, a few major problems were still unaddressed. One major challenge was that I wanted to analyze each development in such a way that it pertains to only one network layer. However, that was difficult because network elements are interrelated, and a development in a firm's supply network cannot be understood in only one network layer. I realized that the solution was to divide each development analytically into smaller *changes* that could be analyzed in relation to each pair of network layers, in which one network layer was where the change takes place, while the other layer contained the result of the change.

This formed the basis of the framework I developed for analyzing economizing on supply network development, which is presented at the end of this thesis. The two network layers a change deals with in the two ways described above were developed to capture the *focus* and *direction* of the change.

In addition, the idea of the three-level analysis (relational, connected relationships, and network) used in the previous phase was in this phase transformed into the third dimension in the conceptualization of economizing, known as *scope*. The reason for this was that the network level of analysis proved redundant in the early attempts to analyze on that level. Taking the analysis one step further toward building the final model (which will be presented in chapters 6 and 7) showed

that no principal differentiation could be made between the network level developments and the developments identified as inter-relational. The essence of both groups of developments was the same; making economic sense of making a development in the supply network by stepping beyond relational boundaries, and connecting relationships to each other.

This also changed the analysis structure. As presented in the thesis, the empirical analysis follows the case and tries to be as close to the empirical world as possible. It has only one level, and the time periods in the structure of the analysis were removed because they were over-complicating the analysis. The analysis was therefore structured using the technology areas. Although this is a simpler and more easily understandable structure for the analysis, the structure of the empirical analysis is an ongoing challenge, because many developments take place across multiple technology areas. It is difficult to present them only as a development in a section that belongs to one technology area. Still, this has not affected the quality of the analysis, and it is only a matter of presentation of the case description and analysis.

The reorganization of the analysis occurred in parallel to a refinement of the framework. The analytical tools in the framework were revised based on how each tool was used in the analysis. After the empirical analysis had matured, a secondary analysis was made on the empirical analysis in order to conceptualize the dimensions of economizing on supply network development. As a result, several approaches were identified that firms can take to develop their supply networks, and the three dimensions of focus, direction, and scope that were utilized to differentiate between them. Later, it was shown that the presentation of the approaches in the secondary analysis could become misleading because they were not principal to the concept of economizing on supply network development; they were only "goods in process,"; in other words, some figurative approaches that were not unique or conclusive. What I had achieved using them was more important; the conceptualization of economizing on supply network development in terms of the three dimensions of focus, direction, and scope.

A few themes were explored to form the concluding discussion, the idea being to discuss the developed framework in relation to a few theoretical themes. In the end, the importance of relatedness and dynamism – especially when supply network developments are studied as a phenomenon – led to highlighting relativity and network effects in the analysis of supply network developments. Working with those themes made it clear to me that I needed to explicitly reflect on the fact that no firm or individual can solely control a development. According to Håkansson and Ford (2002), firms are always influencing the network, as well as being influenced by it. Reflecting this important underlying assumption in the IMP tradition highlighted interaction as a key underlying aspect of my conceptualization of supply network developments. The findings of the analysis indicated that the conceptualization of economizing on supply network development needs to recognize this interrelatedness and dynamism of simultaneous or consequent economizing of different firms. Therefore, eventually, the concept of economizing on supply network development was presented as a firm taking part in developments in its supply network. The phenomenon was also changed accordingly, as illustrated in Figure 3-5.

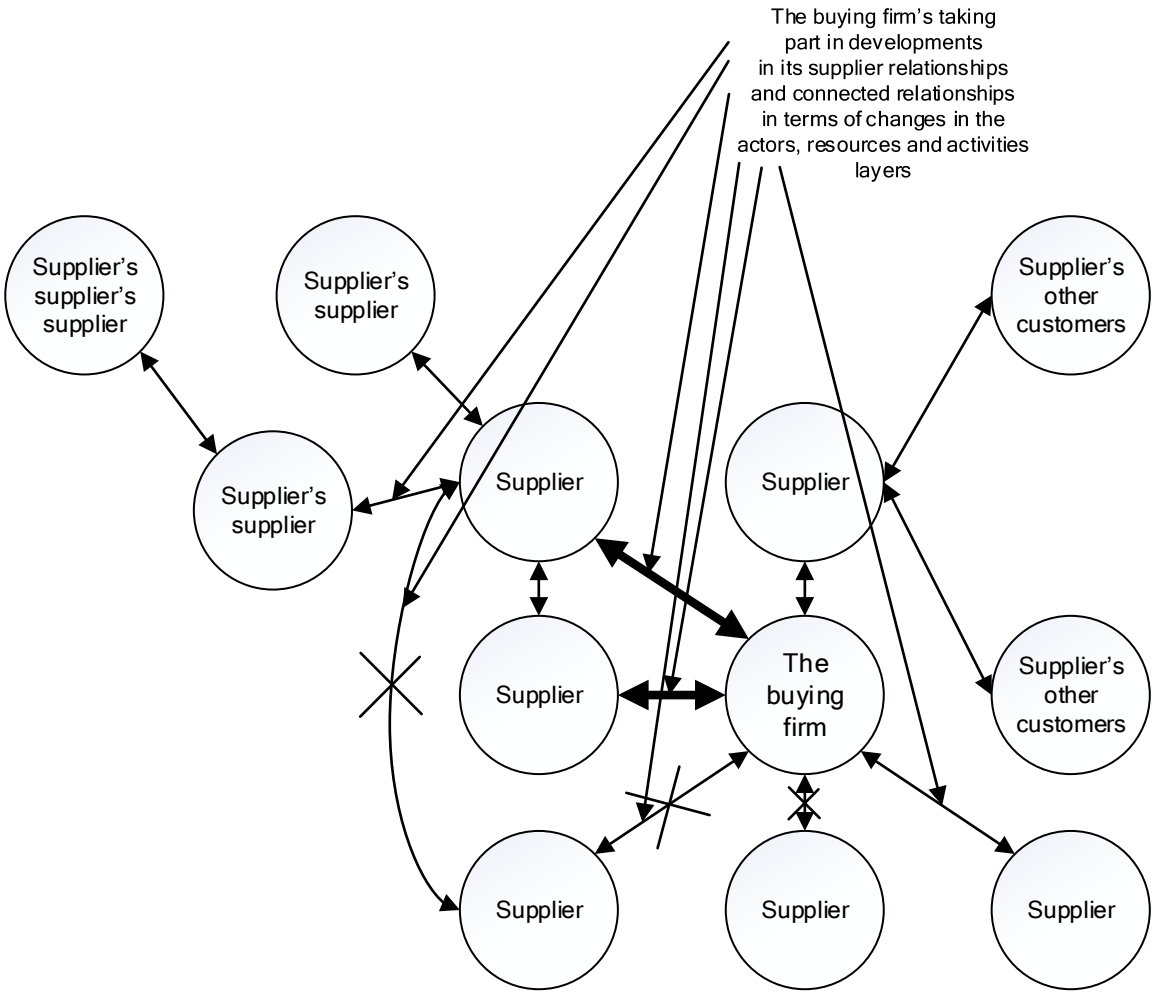


Figure 3-5: The phenomenon under study in the sixth state: A firm's taking part in developments in its supply network

3.2 INTERACTIVE RESEARCH DESIGN

Maxwell (2012) presents a model for presenting the design of a qualitative study. The model consists of two conceptual design elements, goal and framework, and two elements that are more operational, method and research quality (which Maxwell refers to as validity). The fifth element in Maxwell's model is the research questions that play the central role in Maxwell's model, connecting to all other elements. This model highlights the interactive nature of the study, by emphasizing that the five design elements change over time in relation to each other, and that the design of the study is a result of the interactions of those elements. The design of this study is first illustrated in Figure 3-6 with regard to Maxwell's model, and is then discussed below. It is important to note that the design presented below is the final result of various changes along the process of the study. Section 3.1 presented the story of the twists and turns in the process of the study, while the current section presents the research design in its final state.

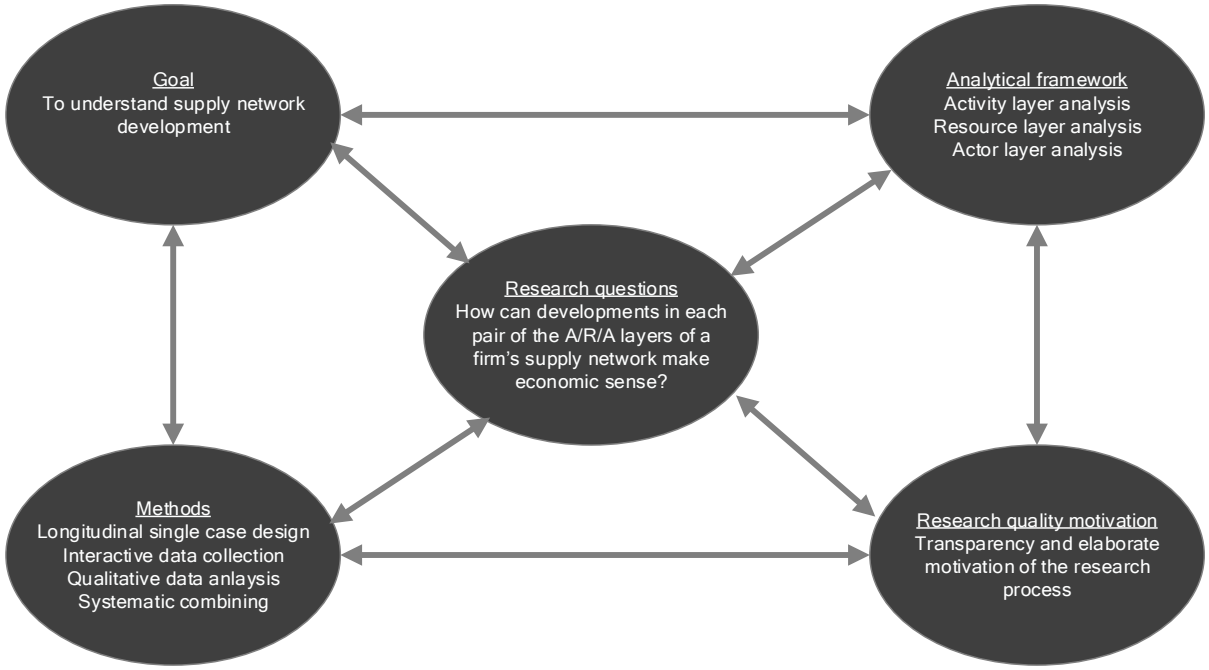


Figure 3-6: The interactive design of this study (adapted from Maxwell (2012))

3.2.1 THE CONCEPTUAL TRIANGLE

This study strives for gaining a better understanding of developments in supply networks of firms. The study relies on research in the IMP tradition. Recognition of the interconnectedness and dynamism of business networks has been essential throughout the process of this study, and is key in understanding the phenomenon investigated here. Easton (1995) suggests that the explanatory power of the IMP tradition is best suited for analyzing changes in business networks.

The study uses and conceptualizes "economizing," a concept that is widely used in other streams of research such as transaction cost economics. The way economizing is defined and used by transaction cost economists (TCE) does not mesh well with the IMP tradition's interactive view of the world. However, during the process of the study, I found economizing used in a limited way by particular IMP researchers (for example, Håkansson et al. (2013) and Holmen and Pedersen (2003)). The way they had used economizing had only an underlying assumption in common with the TCE's definition of economizing: TCE recognizes the firms' endeavor for benefits through economizing, but the concept is used mainly in terms of cost rationalization and as the basis for the make-or-buy decision (Williamson, 1991). In the more recent IMP studies of the supply side of firms, three types of economies are identified as what firms can achieve in collaboration with each other as "the logic of supply networks" (Håkansson and Persson, 2004; Gadde et al., 2010). Hence, I saw potential in utilizing and developing economizing as a concept to understand the phenomenon at hand, supply network development.

Alongside developing the aim, an analytical framework and a set of research questions were developed. The current state of the analytical framework that is the basis for the analysis presented in chapter 5 is structured to analyze developments in a firm's supply network in the actor, resource, and activity layers of the network (Håkansson and Snehota, 1995; Håkansson et al., 2009). In order to capture interconnectedness in the network, the developments were analyzed in terms of changes in pairs of network layers, and this formed the three research questions of the study. Therefore, the

first research question tries to capture each development in the supply network in the actor and resource layers; the second investigates the resource and activity layers for signs of the developments in question; and the third looks into the activity and actor layers for how each development in the supply network can be understood in relation to them.

3.2.2 THE QUALITATIVE SINGLE-CASE DESIGN

Qualitative studies offer unique possibilities for analyzing details in a diversified manner. Instead of presenting general narratives and generic theories, qualitative research can contribute through narratives that are restricted in terms of location, time and situation (Flick, 2006). Qualitative research incorporates possibilities that are useful in studying phenomena that consider change and development, especially by enabling a focus on local perceptions and the dynamics of the phenomena (Bartunek, 2012). As Flyvbjerg (2006:235) points out, qualitative case studies have the advantage to "close in on real-life situations and test views directly in relation to phenomena as they unfold in practice."

This thesis is a product of a five-year long research process, with various redirections and changes of focus. The foundations of the study, the research questions, are perhaps the most important of such products. The qualitative design and the open-ended research questions have helped this process, adding required strength (Edmondson and McManus, 2007) to the empirical investigation. In line with Karlsson (2009), the methodological choice of conducting the study with a case design was made to facilitate exploring the field and to open up opportunities for building theories explaining developments in supply networks. Easton (2010) suggests that case design is most appropriate for answering "how" and "why" questions, rather than "who," "what," and "where."

This is in line with Yin's (2003) argument that answering such questions requires following up with operational links over time, rather than the frequency of their occurrence. The current study, rather than trying to answer pattern-finding questions such as "how often" or "how much," asks questions regarding the quality and posture of the phenomenon it investigates. Supply network developments are studied in terms of the way in which they take place, what they are made of, and how they impact each other in a firm's supply network. Hence a single-case design, where various contextual details are observable and analyzable, makes a suitable match for the aim of the study.

Case research is one of the methodological cornerstones of researching business networks in the IMP tradition (Easton, 1995; Halinen and Törnroos, 2005). A vast majority of IMP research strives for gaining fine-grained qualitative understanding of phenomena related to business relationships and networks with *"an emphasis on temporal evolution and emergence rather than on relationships between variables"* (Bizzi and Langley, 2012:224). This study is no exception to that trend; rather than a substantive ontology, the study features a process ontology viewing the world as processes of change. In this ontology, *"process is fundamental: the river is not an object, but an ever-changing flow; the sun is not a thing, but a flaming fire. Everything in nature is a matter of process, of activity, of change"* (Rescher, 2006:3).

A change can be studied either as an observation of a difference in an organizational entity between two points in time, or as a description of the unfolding of changes in a sequence of events (Van de Ven and Poole, 2005). The latter is the way developments in a firm's supply network are described and analyzed in this study. Development is an intrinsic characteristic of supply networks; they have no start or end. Hence, the case description presents the ongoing process of developing

FlexLink's supply network in a temporal order to grasp a "process theory" that can help to explain (Pentland, 1999) the developments.

The study relies on the main theoretical assumptions of the IMP research tradition (Håkansson, 1982; Håkansson and Snehota, 1995; Håkansson et al., 2009). The IMP tradition owes much of its theoretical development to case studies focusing on inter-organizational relationships, interaction, and industrial networks (Dubois and Araujo, 2004). This is because a case study makes it possible for existing theories to evolve along with empirical findings, by directing and redirecting the empirical investigation based on the theoretical framework (Dubois and Araujo, 2007). It has been argued by Quintens and Matthyssens (2010) that conceptualizations in the field of industrial marketing lack consideration of the role of time in and the dynamics of the phenomena under study. They, like Halinen and Törnroos (2005), emphasize the importance of consideration of time in such studies. In line with Holmen et al. (2007), this study is designed as a qualitative *processual* single case to allow for analysis of the local, temporal, and situational specificities of the case by relying on retrospective and real-time logic.

The case deals with various developments from 2000 to 2013. The data regarding that period was collected between 2009 and 2014. Therefore, both retrospective and real-time data has been collected. Two issues are important to note regarding the longitudinal and retrospective design of this study. First, the case is designed to present developments in FlexLink's supply network that take place over a period of 13 years. The longitudinal approach in the design of this case is an important factor in this study, mainly because it calls for frequent follow-ups on various stories covered by the case. This is seen in the case description in terms of stories of various developments that appear one after another and affect each other in various ways. Second, the retrospective design appears mostly in data collection and has been dealt with in a pragmatic way. This aspect of the research design has been important for the analysis of the study, primarily because it has facilitated matching of the empirical and theoretical investigations; it allows choosing which developments to collect data about and which aspects of each development in FlexLink's supply network need enriched empirical details. In parallel, the empirical and theoretical discoveries made along the way have shed light on further selection of supply network developments to include in the case. The year 2000 has also been arbitrarily set as the starting point for the retrospective investigation.

3.2.3 CONSIDERATIONS FOR THE CASING PROCESS

Ragin (1992) defines the "casing" process as *"making something into a case,"* and indicates that it can bring ideas and evidence – or theory and data – closer to each other. No matter what role theoretical ideas or empirical evidence play in the initiation and development of a study, in a casing process the researcher has an opportunity to create objects out of empirical units, wash them of their specificities, and make them manipulable. The casing process *"makes only certain features relevant and thus allows viewing [the empirical elements] in partial ways"* (ibid.:220). This is done by scrutinizing empirical material and carefully selecting empirical evidence that can help make vaguely defined theoretical ideas more explicit.

This process of refinement of theoretical focus – in line with the selection and packaging of empirical material in the form of a case – is a necessity for case research, because cases cannot be defined or designed beforehand. Casing in this study has been an ongoing process. As addressed

in the section above, the question of "what is a case?" has been answered many times in different ways as the study has progressed, and new findings have emerged as new ways of packaging the case and formulating research questions. This casing process has been a result of the interplay between theoretical sense-making of empirical evidence, as well as the empirical strengthening and sharpening of theoretical concepts.

Siggelkow (2007) argues that a single case can be a powerful example: *"a paper should allow a reader to see the world, and not just the literature in a new way."* By bringing up the examples of Phineas Gage and the talking pig, Siggelkow advocates the capacity of single- case research in building theories. A case can be a special example of a situation for which other similar examples may not exist at all. This is due to the context embeddedness of case studies. However, findings of a single case study are not necessarily limited to that context. Analysis of a case's details can reveal particular insights that can be inferred to "more normal situations."

Nevertheless, case studies hardly ever encompass extreme exceptional stories such as Phineas Gage or the talking pig. Siggelkow (2007) claims instead that a case can be put to at least three major uses: as motivation for a research question, as inspiration for new ideas to explore a phenomenon (but also to sharpen theories), or as illustrations for conceptual contributions. Inspiration has been the main purpose of the case in the current study. The case has played a vital role throughout the research process in the selection of theoretical concepts, the formation of the analysis, and the creation of the analytical framework for understanding supply network development. By learning about the unfolding of different events during the development of FlexLink's supply network between 2000 and 2013, and by analyzing those events along the way, I have gradually built the framework presented in section 2.4 and derived the framework presented in chapters 6 and 7. Without the case, I would have not been able to understand supply network development in this way. With this functionality, the case has been a "tool" (Dubois and Gadde, 2002) in the research process.

In addition, the case as a "product" (Dubois and Gadde, 2002) has played the illustration role in this study. In line with Siggelkow (2007), the case has provided the conceptualization of economizing to capture supply network development, and delivered two benefits. First, it has helped solidify the conceptualization by providing a real-life example as evidence of the claims made. Second, it has helped to clarify the conceptualization by proving empirical examples of the constructs of the concept, thereby making the conceptualization more explicit and tangible for the reader. In addition, the case has evolved over time as the formulation of the phenomenon and the formation of the theoretical and analytical frames around it. In this process, the case has been the primary source of motivation for what to study as a phenomenon and how to problematize it. Hence, the case has also played the motivating role in this study, which functions both as a product of the research process problematizing the phenomenon, and as a tool for theory-building, opening new doors to theoretical exploration.

According to Abbott (1992), there are generally two approaches to single case narratives: the population/analytic approach, and the case/narrative approach. In a population/analytic view of case studies, *"caseness has to do with endurance and thingness; appearance, disappearance, combination and transformation are problematic and must be treated as censoring, group disappearance, or some other makeshift"* (ibid.:63). On the other hand, in a case/narrative

approach, *"transformation in attributes can be so extreme that a case which began as an instance of one category may complete a study as an instance of another; a state can become a nation, a craft can become a profession, and so on"* (ibid.:63–64). In the present study, a case/narrative approach is taken, where the case is made with blurry boundaries, case-specific meanings are assumed for the case properties, complexity in the case is simplified during the analysis, and case transformations are openly taken advantage of, rather than being concealed.

3.3 INTERACTION WITH THE EMPIRICAL WORLD

This study draws on qualitative data collection and analysis. Hence, throughout the study, qualitative data has been collected and interpreted. According to Miles and Huberman (1994) the researcher, through its interpretations, is attached to its study object not less than its informants. Those interpretations are gained either by understanding the interactions within the study object, or by empathizing with the subject of inquiries. The researchers are naturally affected by *"what they hear and observe in the field, often in unnoticed ways"* (ibid.:8). An interview is not one party's attempt to collect data from the other. Rather, it is a "co-elaborated act" with which both parties are involved.

The case in this study is developed based on my formal and informal, recorded and unrecorded, and semi-structured and unstructured interactions with various people in the empirical field. Discovery has been made possible through interacting with the informants, and various new findings have resulted from this interactive approach during the process of the study. Triangulation has been used not to converge lines of inquiry (as Yin (2003) suggests), but to reveal complexity in the empirical phenomenon (in line with Dubois and Gadde (2002)). Hence, the triangulation done in the study is best described as "perspective triangulation," where the viewpoints of multiple sources of information are used to enrich empirical description of the stories covered in the case by grasping different perspectives on each empirical story. Perspective triangulation is done by combining data from various data sources such as interviews, follow-up emails, phone calls, supplementary documents, and occasions of informal interactions with the informants. The sub-sections below elaborate on my interactions with the empirical world, and the roles of different sources of data in this study.

3.3.1 INTERVIEWS

Most of the data used to create the case in this study is gained through interviews with informants within and outside FlexLink. Dubois and Gadde (2002) distinguish between passive and active data; the former is what the researcher intends and plans to find, and the latter is what enables discovery of new unplanned information. Passive data is collected in a one-way manner, where the interviewer asks questions and the interviewee answers, and the interviewer plays an active role in the collection of passive data. When collecting active data, however, the interviewer has a more passive role because data is collected through discussions and interactions with the interviewee.

Throughout the present study, most of the interviews I conducted were active, where I and my interviewee(s) shared the responsibility for taking the discussions forward. I used interview guides for all of my interviews, which included open, theory-driven, and confrontational questions (in line with Flick (2006)). Some started with relatively specific questions to follow up on previously collected data, while some others started more openly. For the most part, I started my interviews

with general questions and follow-ups, and let the interviewee talk about what he or she finds interesting with regard to the general guidelines and questions I asked. As a complement to the interviewees' storytelling, I asked several questions to redirect the discussion, but was never solely responsible for the topics discussed in any interview.

Some of the follow-up interview questions conformed to the interview guides, and some were spontaneously created during the interviews. In most of my interview guides, I specified some major topics to cover and some keywords and phrases to help the interviewee better understand what I was looking for. In most of them, I also included follow-up questions regarding stories and data I had heard about and collected previously from the same interviewee or others. I discovered that the spontaneous questions played an important role in my interactions with the empirical world. Coming up with such questions while interviewees were telling their stories was primarily inspired by my understanding of the theories that I had read or written about for the case study. Unsurprisingly, the farther I went in the research process, the more profound and useful my follow-up questions became. This form of interviewing is best described as a semi-structured format, closer to the unstructured end of the interview structure spectrum (Bryman and Bell, 2007). This flexibility allows for rich detailed answers that qualitative case research needs (Flick, 2006). Nevertheless, closer to the end of the study, as I was settling on the final forms of the phenomenon, case, and analysis, more passive forms of data collection were used in order to supply the missing pieces of information that were helpful for the study to make sense as a whole. In most cases, that type of information was collected using follow-up emails.

With the description above, it is evident that active data collection through interaction with the empirical world has been the reason for the many redirections in this study in response to unexpected findings. Such an interactive approach to data collection has been the most substantive support for the application of the systematic combining approach in this study.

The case is made of a backbone contextual description that supports various stories of developments in FlexLink's supply network. The stories dealt with problems and challenges that FlexLink and its supply network faced and/or approached, opportunities that emerged, new initiatives undertaken, and interesting encounters of FlexLink employees (with different backgrounds and job titles) with other parties. Most of the stories were discussed with multiple informants in interviews, through follow-up emails, or during informal interactions, in order to get a better understanding of the complexities of the stories. In this study, I have tried to triangulate perspectives by following up most of the stories (or at least the most important ones) to diversify the various aspects of the stories covered in the collected data. This, in line with Dubois and Gadde (2002), has only served to find new directions for theoretical and empirical investigation, and not to verify the collected data.

As presented in Table 3-1, most of the interviews were conducted with FlexLink employees. The study started with a few interviews with the director of the supply chain group.[5] That director was then replaced by a new one and a few more interviews were conducted with the replacement director. This choice of interviewee was mainly motivated by the holistic knowledge of FlexLink's supply management, which was needed at the beginning and at various times during the process

[5] The position is called "director of supply chain" at FlexLink.

of the study. Furthermore, both the former and new directors of the supply chain group of FlexLink were involved in numerous interactions covered in the case description. This is the most important reason for the major influence of their viewpoints in the formation of the case.

As the study progressed and new topics came up, new informants were chosen with the help of the previous ones. New interviewees were chosen by snowballing, mainly based on the topics I intended to explore at each point in time. The main criterion for the choice of new interviewees at each point along the process was their involvement in the interactions with suppliers, which I intended to investigate at that point in time. During each interview, a number of topics and stories were left open to further data collection. In such situations (which were very frequent), I would ask the interviewee about whom s/he thinks can be a suitable informant about the topic at hand.

A handful of other interviewees were chosen during the process in order to grasp more details and practical information about the day-to-day interactions between FlexLink and its suppliers. Because all of the manufacturing activities related to FlexLink's products are performed by its suppliers, the product quality group has an important role to play in FlexLink's supplier relationships; a large share of the technical discussions with the suppliers involves the manager and other engineers that work in the product quality group of FlexLink. Hence, FlexLink's product quality manager was one of the most important interviewees in this study, especially because he has been present personally at various events in FlexLink's supply network development in the earlier years covered by the case.

Most of the stories related to the beginning of FlexLink's China sourcing, and earlier years of its relationship with IM2 were collected with the help of FlexLink's product quality manager. In addition, I interviewed a number of other FlexLink employees in order to grasp their particular viewpoints on the stories of FlexLink's developments in its supply network. One project purchaser, one strategic purchaser, and two logisticians (one in Sweden, and one in the firm's office in China) were interviewed to capture developments, opportunities and problems related to the coordination of activities and the day-to-day dealings with its suppliers in Europe and China. Those interviewees were chosen because they have been personally involved in the day-to-day interactions in focus. Furthermore, my interviews with a design engineer, a quality engineer, and the manager of the China Sourcing unit focused mainly on the cooperation between FlexLink and its suppliers in Europe and China regarding new product development and technical problem-solving. I also interviewed the corporate development specialist, formerly the director of the supply chain group, to learn about FlexLink's development of sourcing and marketing strategies, and the role of strategies in FlexLink's decisions.

In 2011, I traveled to China to visit FlexLink's China Sourcing unit and three of its suppliers. The interviews I conducted there were very important for me to understand FlexLink's supplier relationships better. There, I interviewed not only FlexLink employees (described above), but also representatives from three of FlexLink's suppliers, and visited their shop floors. Consulting with FlexLink's director of the supply chain group, and its China sourcing manager, I selected DC1, MS3, MS4, IM3, and SS1 to visit. There were different reasons for choosing those suppliers. DC1 was one of FlexLink's first supplier relationships in China, and FlexLink's relationship with DC1 still seems promising. Hence, I realized that visiting this supplier and hearing their side of the story of establishing and developing a relationship with FlexLink can be important for the case

description, especially because many of the stories I had encountered by then related to the developments in FlexLink's supply network involving DC1.

FlexLink's relationship with MS3 was important because FlexLink had invested heavily in it, but FlexLink did not consider it as close a relationship as it had with DC1. I needed to see the difference between FlexLink's approaches to the two relationships from the suppliers' perspectives. FlexLink's relationship with MS4 was also unique; MS4 is a Europe-based company that operates production facilities in China, and FlexLink has a relationship with MS4 in Europe. That relationship has extended to a relationship between FlexLink's China Sourcing unit and MS4's manufacturing and sales units in China. The way FlexLink dealt with MS4, given those circumstances, was especially interesting for me. Later, as I learned that FlexLink's relationship with MS4 was facing considerable problems, I became even more interested in the relationship and tried to follow up on its developments in the future interviews. Due to practicalities, IM3 and SS1 were later removed from the list.

As mentioned above, data collection in this study has been in parallel to theoretical investigation and data analysis. Interviews were conducted at different times over a period of five years, and the data collected from them has been used for forming the case and performing the analysis in the same period. To be able to do so, at various occasions I have needed to return to the recorded interviews and use different parts of the data. Sometimes I have returned to locate an unused piece of data from an interview, and sometimes I have returned to listen to a part of an interview again from a different perspective. To make that possible, all of the interviews have been recorded, and most have been transcribed. The interviews that have not been transcribed are recorded using an integrated audio-text technique provided by an application software, called AudioNote. With this technique, notes taken during and adjusted after an interview are automatically integrated with timestamps in the interview audio recording. This enables the notes to be used for reference to different parts of the interview.

The interviewees in China had different levels of English language expertise, and I needed the help of interpreters to interview some of them. In all of the interviews, at least one of the employees of the supplier firm attending the interview could speak English. The role of those English-speaking interviewees was to answer some of the questions (that were related to their areas of expertise), and to translate my questions and the answers of the other interviewees. The manager of FlexLink's China Sourcing unit, its logistician, and its quality inspection engineer attended all of the interviews with the suppliers in China. This may have affected the answers of the interviewees; however, this hardly seems to have been the case, because the interview questions were not controversial with regard to the suppliers' relationships with FlexLink. Most of the questions were about areas of collaboration in those relationships, the content of the relationships, the sub-suppliers each uses in relation to FlexLink, and examples of developments in those relationships and connected relationships. Occasionally, the FlexLink employees attending those interviews joined the discussions and added valuable details about the developments at focus.

All of my interviews involved various stories of developments and events that have taken place from 2000 to 2013, in FlexLink's supply network. All of the interviews ranged from 1.5 hours to 2.5 hours, and took place between 2009 and 2014. In most interviews, both current and past issues were discussed. As described above, stories of developments in FlexLink's supply network were

sometimes collected in interviews with the directors of FlexLink's supply chain group and the product quality manager, and the more specific aspects of the stories were discussed with interviewees that had the most personal experience with them.

Table 3-1: List of interviews

Target		Number of interviews
FlexLink	Director of the supply chain group	8
	Logistician for China sourcing	1
	Product quality manager	2
	Quality engineer and responsible for production tools	2
	Corporate development specialist	1
	Strategic purchaser	1
	Project purchaser	1
	Design engineer	1
	Manager for China sourcing	3
	Logistician and administrator in China sourcing	1
DC1, China	Assistant general manager, Senior sales and logistics officer	1
MS3, China	General manager, Sales responsible	1
MS4, China	Project manager and technical engineer, Commercial manager	1
	Total	24 interviews

3.3.2 SUPPLEMENTARY SOURCES OF DATA

In addition to the interviews, other sources of data were also used to complement the case description. They include observation visits to production and assembly shop floors, informal interactions with the interviewees, follow-up emails, and documents. Table 3-2 summarizes those additional sources of data in this study.

The visit to China made it possible to perform four participant observations of the interactions between FlexLink and its suppliers. Bryman and Bell (2007) discuss various merits of participant observation, including seeing through others' eyes, learning the native language, creating opportunities to grasp what is taken for granted (as compared with interviews), sensitivity to context, opportunities to encounter unexpected situations, and naturalistic emphasis. Karlsson (2009) recommends shop floor observations for giving the researcher an opportunity to get a feel for the overall working environment and systems.

Visiting the shop floors of FlexLink and three of its suppliers in China made it possible to exploit a number of these opportunities. First, I became familiar with their manufacturing systems and viewed how some of the points discussed during interviews were actually dealt with in practice. Second, having the chance to be on the shop floors and see how the daily manufacturing, inventory keeping, and logistics work is done provided me with a better understanding of the technical

language, which is more difficult to grasp when relying on interviews alone. Third, and most important of all, it became an opportunity to realize new aspects to continue my empirical investigation. During all of the shop floor visits, I came across a lot of new questions that were mostly operational. For instance, during the visit at MS3's shop floor, my conversation with its general manager led to an interesting discussion on the important role of MS3's relationship with FlexLink in the procurement of its raw material and making deals with its raw material suppliers. During the visit at MS4, I realized that the majority of MS4's shop floor is dedicated to working with another customer, and that FlexLink is not at least operationally prioritized. I went on to collect data regarding those issues in the other interviews and follow-up emails, and in the latter example, a few months later I heard about the FlexLink–MS4 relationship starting to end.

In addition to the semi-structured interviews and observation visits, I have also interacted on various occasions with the interviewees in order to better familiarize myself with their situations. Over lunches, afternoon breaks, and long travel times, I have had the chance to talk with the informants and prepare both them and myself for the interviews.

On many of these occasions, I have had the chance to obtain new information and add new aspects to my empirical investigation. Such occasions can be categorized as close to what Bryman and Bell (2007) call unstructured interviews. In an unstructured interview, discussions take place around general topics proposed by the interviewers, or the interviewee freely answers a single question asked by the interviewer. *"Unstructured interviewing tends to be very similar in character to a conversation"* (ibid.:474). In the current study, although those occasions were not arranged in the form of what is conventionally known as interviews, nor they were ever recorded or transcribed, the discussions played an important role in my empirical investigation by preparing me and my informants for the interviews, familiarizing me with the field to make the information more tangible, and helping me better understand the context in which I am studying the phenomenon of a firm's supply network development.

In some instances, various important issues that were discussed in the interviews were followed up later for more details or updates. Those follow-ups were in the later interviews in some cases, and in some other cases consisted of follow-up emails. Most of the follow-up emails were exchanged with FlexLink's director of the supply chain group, as my key informant. Issues covered in those emails ranged from minor details such as lists of FlexLink's purchases from a particular supplier, or documentation related to how a specific quality problem was identified and approached by different parties involved, to more general matters such as lists of suppliers.

Bryman and Bell (2007) discuss the use of organizational documents in qualitative research, including memos, internal reports, photographs, and so on. Flick (2006) contends that when a document is produced, it is produced for a reason, as, for example, the means of communication between two or more parties in order to fulfill a specific requirement. When using a document in one's research, Flick emphasizes the importance of considering the original purpose of the document. In this study, in many cases the interviewees provided such supplementary documents, sometimes to complement the discussions during interviews, and sometimes to follow up on previously discussed issues.

The most important of these documents for this study were internal reports, product catalogues, annual reports, and product drawings. Annual and internal reports of the interviewed firms were used on several occasions for collecting general information; however, the use of product catalogues and drawings was more specific. In cases when specific products were in focus and arrangements for their production and distribution were important for data collection and analysis, those drawings and some basic technical information about them from the catalogues were used.

Table 3-2: List of supplementary sources of data

Supplementary source of data	Target	
Observation visits	FlexLink, China	Assembly shop floor
	DC1, China	Production shop floor
	MS3, China	Production shop floor
	MS4, China	Production shop floor
Informal interactions	FlexLink	Director of the supply chain group
		Corporate development specialist
		Manager for China sourcing
		Logistician and administrator in China sourcing
	DC1, China	Assistant general manager
		Senior sales and logistics officer
	MS3, China	General manager
		Sales responsible
	MS4, China	Project manager and technical engineer
		Commercial manager
Follow-up emails	FlexLink	Director of the supply chain group
		Quality engineer and responsible for production tools
		Design engineer
		Manager for China sourcing
	DC1, China	Senior sales and logistics officer
	MS3, China	General manager
	MS4, China	Project manager and technical engineer
Documents	FlexLink	Annual reports
		Product catalogues
		Product drawings
		Other reports and mails
	DC1	Internal reports

3.4 TRANSPARENCY TO ENSURE RESEARCH QUALITY

According to Van Maanen et al. (2007:1149), the discovery process in qualitative case research is usually *"messy, idiosyncratic, and difficult to articulate."* A systematic combining approach can help motivating the quality of the research. According to Dubois and Gadde (2002; 2014), case

research performed with a systematic combining approach is *non-positivistic*, *non-linear,* and *not based on replication logic*. Dubois and Gibbert (2010) suggest that it is vital to consider and transparently describe the interplay (see Figure 3-7) between these dimensions and maintain the fit throughout the study. Dubois and Araujo (2007) indicate that the quality of case research should be viewed in relation to its theoretical contributions and success in convincing the reader about the findings of the study.

> *"[...] the best way to help readers evaluate a case is the presentation of the empirical material informed by the conceptual contribution, rather than to break the case up in discrete chunks for the purposes of compliance with quality standards on data collection and analysis. Thus, the case itself and a description of the process the authors went through to develop the conceptual contribution might be of greater interest to the reader than the demonstration of exhaustive method checks."* (Dubois and Araujo, 2007:178)

Dubois and Gibbert (2010) believe that in abductive studies, the quality of the study should be demonstrated by convincing the reader that the fit between the three dimensions of research are ensured by simultaneously developing theory and redirecting the empirical investigation in a process of learning. Showing the different steps of iteration that the study passes through transparently, in order to develop the theory and define the case boundaries, is very difficult, but at the same time vital to ensuring the quality of the study.

> *"... the view on case method as one methodological category need be replaced by descriptions of the unique choices and iterations that are made in particular studies and the way in which the combination of concerns regarding method, theory and empirical phenomenon evolves in the process."* (Dubois and Gibbert, 2010:135)

In line with Dubois and Gibbert (2010), the quality of this study is motivated by thoroughly describing the research process. Section 3.1 provided a detailed description of the process of this study, including motivations for the various iterative changes and back-and-forth moves between the theoretical and empirical investigations that took place during this study. In section 7.5, the issue of evaluating the research quality is further discussed, together with a number of other methodological reflections that I came across during the process of the study. In that section, based on what I have experienced during this study, I reflect that the quality of the study can be motivated by discussing the appropriateness of the conduct of the study and the choices made during its process, the relevance of the problem it investigates, and the usefulness of its findings. Success in showing that the study is conducted with high quality depends on how well the process of the study is described and to what extent the changes in the research dimensions are convincing to the reader.

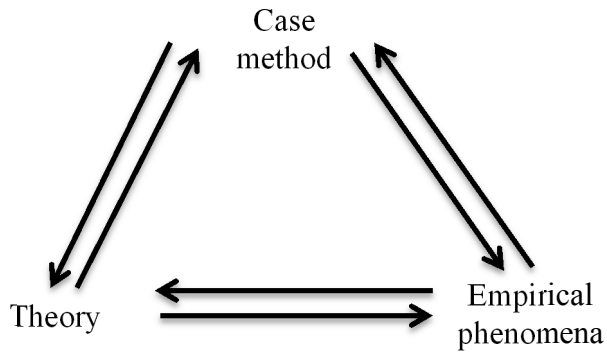


Figure 3-7: The interplay between the dimensions of research (source: Dubois and Gibbert (2010:129))

Various challenges are inherent to case research in network studies. Halinen and Törnroos (2005) raise four such challenges: network boundaries, complexity, time comparisons, and case comparisons. The first three challenges are discussed below, while the last one is excluded due to irrelevance to this study. The elaborate process description presented in section 3.1 also covered how these challenges were addressed.

The challenges of network boundaries and complexity deal with the problems associated with analyzing interconnectedness in business networks. Within the IMP tradition, rather than being considered to be operating as islands, companies are assumed to be parts of a wider network, and defined by their interdependencies with the other parts of the network (Håkansson and Ford, 2002); these networks cannot be limited by any natural boundaries.

The assumption of the nonexistence of clear natural boundaries (Håkansson, 1982; Araujo et al., 2003) has resulted in various notions of analytical boundaries in order to identify what a firm is and what it is not (Snehota, 1990). Elements in the industrial network are interconnected, and no actual boundary can be distinguished between any parts of the network; actors, activities, and resources relate to each other in one way or another. However, for the purpose of analysis, the researcher needs to start by drawing arbitrary boundaries in order to limit the study so that it can be analyzed (Halinen and Törnroos, 2005). As the study progresses, the boundaries of empirical investigation gradually emerge in concert with the shaping of the theoretical investigation (Dubois and Araujo, 2004) during the matching process (Dubois and Gadde, 2002).

As Storer et al. (2002) describe, three concepts can be identified in IMP research to address this issue: *network context*, *network horizon*, and *environment*. Network context is what the firm takes as its perspective. This means that what firms consider when making decisions in networks is their perspective regarding the network, and therefore constitutes their network context. There is more to the network than the firms have knowledge of, and which they cannot consider when making decisions. This forms their network horizon, defined as what firms are aware of as the network surrounding them. However, the environment, is made up of the rest of the network – this part is what the firm neither considers when making decisions, nor is aware of, but which exists and is related to the firm's network context and horizon.

In this study, data collection focused primarily on FlexLink's supply network, as what Storer et al. (2002) call the "network context." However, in various instances, issues were brought up that related to the "network horizon" of FlexLink. Such issues concerned the connected relationships

in FlexLink's supply network, firms to which FlexLink was connected only indirectly through the suppliers. This distinction helped the formation of one of the dimensions of the model developed in the study (see chapters 6 and 7), namely the *scope* dimension. However, as will be described in chapter 7, the distinction that the scope dimension makes between relational and inter-relational economizing is not limited to the implications of the network context/horizon distinction. Regarding the network environment, due to the limited data collection from other firms in the network, FlexLink's "network environment" (see Storer et al. (2002)) was not focused in the data collection, although in a few instances information from the interviewed suppliers regarding the network environment was used in the case. Nevertheless, due to having a firm's perspective in focus, FlexLink's network environment was not considered a central issue in the case description or analysis.

Dubois and Gadde (2002) also raise the problem of where to draw analytical boundaries – which aspects to include in the case, framework, and analysis, and which aspects to leave out. With a systematic combining approach, the researcher is in a constant battle with theoretical and empirical choices. However, this is a justified battle, a crusade against getting locked into predefined theoretical bounds or empirical disorientation. According to Dubois and Gibbert (2010) the way to justify this is to transparently guide the path of discoveries and reorientations taken during the study, clarifying the choices made in the matching and redirection processes, as done in section 3.1.

The time challenge is associated with the dynamic characteristic of business networks. Bringing the time aspect into the case and analysis creates complications for the research process (Halinen and Törnroos, 2005). Dubois and Gadde (2002:557) describe this challenge as: *"Studies focused on processes have to come to an end whereas the processes in the real world continue. This makes the conclusions a function of the time at which the study was conducted."*

The methodological choice to undertake a processual case design in this study was also given this important consideration. Sub-section 3.2.2 elaborates on this choice and its implications, and sub-section 7.5.2, at the end of the thesis, expands this discussion as a methodological implication of the study, where this problem is discussed in relation to the role of the new information that the researcher encounters over time in the study's theory- building capacity.

4 FlexLink's supply network development

This chapter describes the empirical case. The case is the story of development of the supply network of a company, called FlexLink, in the years from 2000 to 2013. The case description starts with a background to FlexLink, the characteristics of its products and sales, its overall approach to supply management, and its approach in general when dealing with decisions that they consider strategic. The background is then followed by a description of various developments in FlexLink's supply network, divided into three time periods: prior to 2004; 2004 to 2009; and 2009 to 2013. The choice of time periods has been based on events that have had important impacts on the turn of events in the story of the case as a whole. Throughout the case description are references to various suppliers and sub-suppliers of FlexLink. In order to maintain confidentiality, all supplier names are anonymized with the use of supplier codes, comprised of two letters and one number. The letters represent the technology area of the operations of the supplier in relation to FlexLink, and the number is assigned randomly without any chronological or alphabetical considerations. A list of all suppliers named in the case description is provided in the Appendix.

4.1 FLEXLINK

FlexLink is a provider of automated production flow solutions established at SKF[6] in 1980 in Sweden to enhance the efficiency of manufacturing within the company. As early as 1982, FlexLink had already managed to acquire major customers in Sweden, Germany, France, Italy, and Austria, and by 1989, FlexLink had established sales offices in Canada, USA, and Japan. In 1991, FlexLink's first distribution center was set up in Europe, and by 1994, FlexLink had set up sales offices in Asia and Australia. In 1994, FlexLink became one of SKF's divisions, and in 1997, the majority of its shares were acquired by EQT Scandinavia[7]. Since then, FlexLink has expanded its sales to various countries and acquired majority shares in various companies within the industrial automation industry. Some examples of FlexLink's acquisitions are FL Solutions Oy in Finland (in 1999), FlexTek and PCT group in USA (in 2001), Techne in Italy (in 2007), Schüco International in Germany (in 2010), and Oberberger Daten-und Systemtechnik GmbH in Germany (in 2013). Furthermore, in 2005 FlexLink established an assembly unit in Poland, which became FlexLink's international distribution center in 2012. In 2005, all outstanding shares of FlexLink stock were bought by ABN Amro Capital, and by the end of 2011, Coesia Group acquired all FlexLink shares.

FlexLink's net sales and the number of employees have experienced a relatively constant growth since 1994 (see Figure 4-1). In 2013, the 852 employees of FlexLink earned 1,664 million SEK in net sales for the firm.

[6] SKF AB, the world's leading manufacturer of bearing systems, founded in 1907.
[7] A group of private equity funds, active in the USA, Asia, Northern Europe, and Eastern Europe.

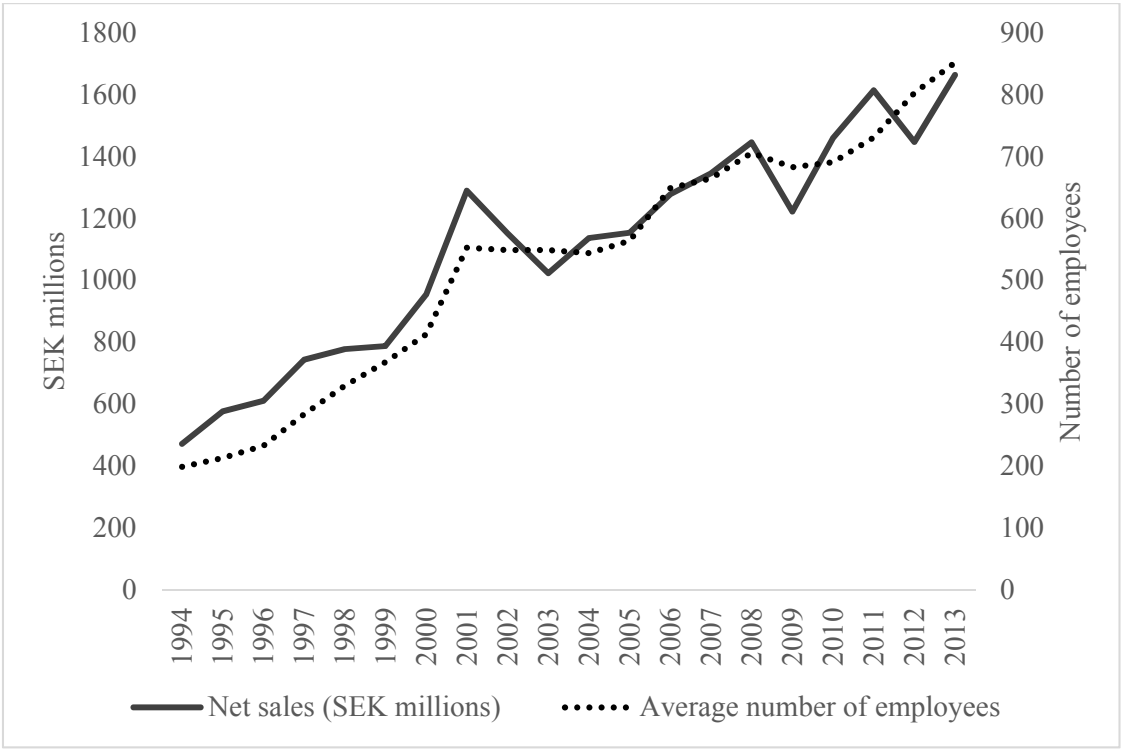


Figure 4-1: FlexLink's net sales and number of employees (adapted from FlexLink's annual reports 2000–2013)

FlexLink's products include a variety of conveyor systems and solutions for product handling and line balancing for different industries. They have two types of sales: 1) a customer provides FlexLink with the specifications and contracts with FlexLink to design a customized conveyor system for a factory; or 2) the customer designs the system on its own or with an outside designer, and orders only a number of specific components. In the latter case, the designers are sometimes the customers. The decoupling point in FlexLink's manufacturing planning has an important role in facilitating this method of sales. All of FlexLink's components are like "Lego-block components" that can be used with high flexibility and ease in different situations. This makes it possible to produce them anywhere in the world, and have the final users assemble and operate them based on their needs.

FlexLink is active in three sales areas, including the Americas, Asia/Pacific, Europe Central and Europe West. Europe is the geographical area standing for the largest share of sales, roughly 50%. When it comes to market segment, the fast-moving consumer goods industry contributes the most to FlexLink's revenues, followed by the automotive, health care, and electronics industries. Approximately one third of FlexLink's total revenues are from component sales, and the remaining one-third are from system sales. As customers are becoming more interested in purchasing complete systems, this share is increasing.

4.1.1 PURCHASING AND SUPPLY MANAGEMENT IN FLEXLINK

In 2010, FlexLink reported its organizational structure as being divided into three support and four operational functions (see Figure 4-2). All of FlexLink's manufacturing and most of its assembly of components are done by its suppliers. This has important implications for FlexLink's organization. Generally, new products are developed through collaborations between the offer creation function and FlexLink's suppliers. The Product & Supply division maintains the relationships with the suppliers of the standard range of components and modules.

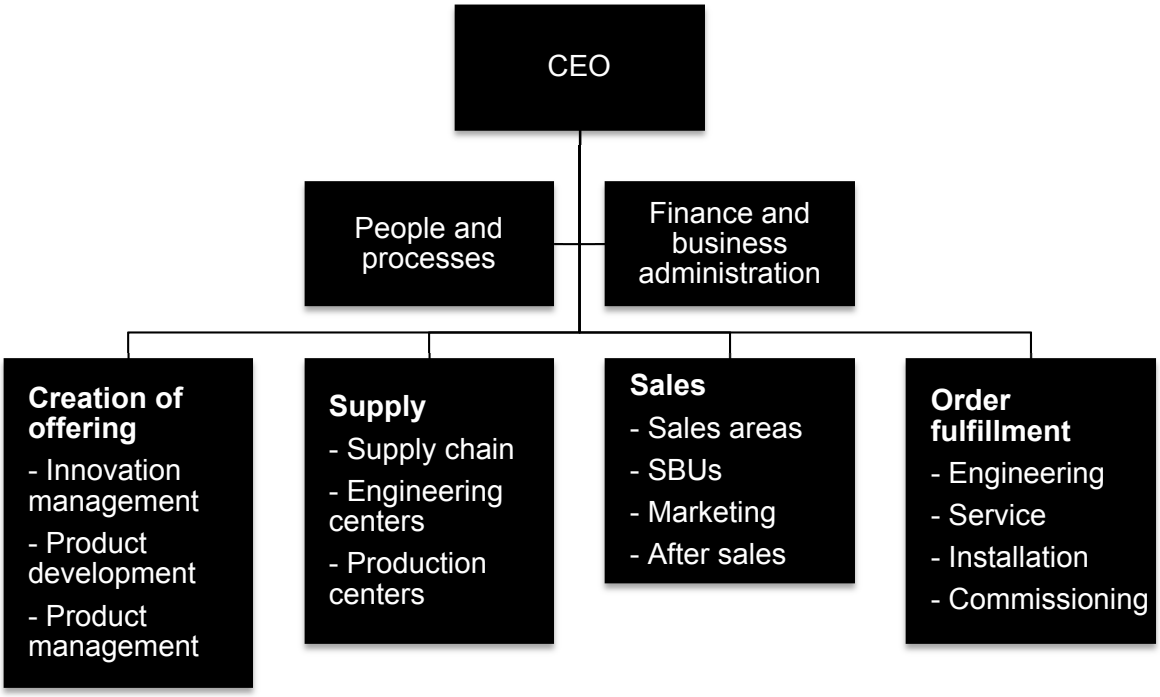


Figure 4-2: FlexLink's organizational structure (adapted from FlexLink's annual report 2010)

For system sales, where FlexLink receives a direct order from customers, FlexLink's suppliers deliver the products directly to the customer (or, for FlexLink-designed systems, to FlexLink's sales unit for assembly in its workshop). Additionally, FlexLink's suppliers regularly manufacture various sets of the products based on forecasts made by them or by FlexLink, and deliver the products to the International Distribution Center (IDC).

The majority of FlexLink's supplies, 60% to 70%, are sourced from Swedish suppliers, 5% are supplied in China, and the rest are procured in the U.S. and other European countries. U.S. suppliers, contributing a small share of FlexLink's supplies, are responsible for supporting the needs of FlexLink's business in the U.S. FlexLink employs a dual sourcing strategy in a number of its relationships for different reasons. For the American suppliers, where the distances are long and delivery certainty is critical, transportation and lead-time issues are the drivers of this strategy. In order to ensure competition among the European suppliers, the dual sourcing strategy is also part of a small number of its European relationships.

FlexLink has suppliers that utilize a variety of technologies. The manufacturing technologies contributing to the biggest shares of FlexLink's business volumes include plastic injection molding, aluminum die-casting, machining, stamping, stainless steel die-casting, zinc die-casting, plastic extrusion, aluminum extrusion, and laser cutting. Normally, FlexLink component procurement decisions are made at its headquarters in Sweden; however, certain items have to be purchased locally. For instance, in a full system order, when a labeling machine (not one of the normal components) is needed, a local purchase is made. In such cases, local purchasers are responsible for the supplies.

In the Product & Supply division, the main focus is on the quality, price and availability of the items. In this division in Sweden, two employees work with supplier evaluation and strategic procurement, and three perform the daily call-offs. Three other employees in the product quality group are responsible for the technical issues of suppliers. Moreover, the procurement organization in China includes two product engineers for technical and quality issues; one is responsible for quality assurance and support for engineers, and the other serves as logistics coordinator (responsible for transportation and customs administration).

Some of FlexLink's products are made of multiple components, each of which can be produced by one supplier. For instance, a product known as an idler end model 2[8] consists of a number of components, each of which is produced by one of FlexLink's suppliers, and they are all assembled by FlexLink Engineering in Malaysia. As shown in Figure 4-3, the idler end includes a side plate (die-cast aluminum from supplier DC1), connecting strip (stamped steel from MS3), guiderail (injection-molded plastic from IM3), shafts (turned steel from MS4), spacer (machined aluminum from MS3), and bearings (from BR1). Everything is sent to Malaysia through the consolidation point in Shanghai using a transportation company in China. A planner at FlexLink Engineering Malaysia manages their local inventories, based on the orders he receives from the planner at FlexLink headquarters in Sweden. He issues orders and invoices to the Chinese suppliers through the FlexLink China Sourcing unit, and the details of the purchase are handled by FlexLink China Sourcing in Shanghai. Everything is shipped to FlexLink's IDC in Europe after assembly at the Malaysian unit.

Every year in January, FlexLink begins a new product development project. Those projects are often based on interactions between FlexLink and its customers, and sometimes the unexplored capabilities of suppliers inspire FlexLink to develop new products to access those capabilities. FlexLink develops a concept, makes the prototypes, designs the tools needed for manufacturing those products, collaborates with the suppliers on finalizing the designs and adjusting the tools, and finally coordinates the production, transportation, assembly, and inventory management of the new product. Since this process usually takes a couple of months, FlexLink and its suppliers are continually engaged throughout the year in some aspect of developing new products.

When developing and producing a new product, the manufacture of the old models of the same products does not stop. A certain stock level of spare parts for each model of each product is kept in FlexLink's IDC for 10 years. However, FlexLink removes the old products from the catalogue and discontinues marketing them.

[8] Which is one of the aforementioned "Lego-blocks."

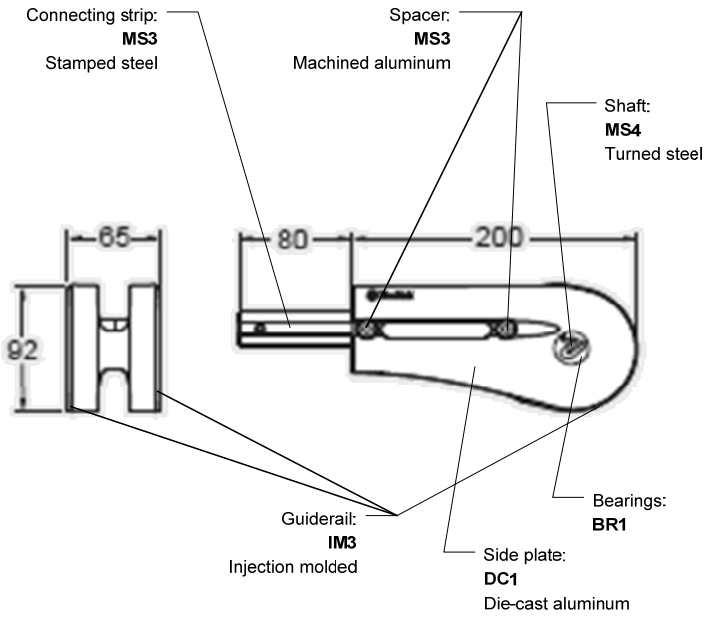


Figure 4-3: Idler end model 2 (supplier names in bold)

FlexLink's approach in its supplier relationships

When initiating a relationship with a supplier for producing a product, FlexLink makes only limited promises. Those negotiations conclude having established a price that is valid for 12 months. This necessitates that both parties assume some risks due to possible changes in currency rates. In cases where FlexLink is larger than the supplier, FlexLink offers deals to the supplier to absorb the currency fluctuation risks, and to protect the supplier from losing money in this way. In exchange, the supplier agrees not to charge FlexLink extra margins for covering for such risks. FlexLink's corporate development specialist addressed this, when interviewed:

> *"I think it's common sense. In the end I don't think that the big guy wins by pushing the currency exposure to the little guy. It is better if the big guy takes care of the currency exposure."*

FlexLink buys and provides most of the tools that suppliers need for producing FlexLink items, but does not promise specific purchase volumes for the items. However, FlexLink does promise suppliers that if the relationship discontinues at any point, FlexLink will buy certain volumes as the final deals. Sometimes, FlexLink needs a supplier to produce certain volumes of an item, while the supplier needs to produce that item in larger batch sizes to be economically feasible (resulting in, for instance, six months or one year's worth of extra supplies in excess of FlexLink's needs). Especially with the tool-dependent items, setting up the tools is a timely and costly process. Hence, it is important for FlexLink's suppliers to produce batches that are as large as possible while having the tools set up. In such situations, FlexLink will commit to buy that excess stock sometime in the future, but does not buy them straightaway. Besides, every now and then, FlexLink and its suppliers exchange and discuss production plans to give each other better possibilities to forecast and plan their production schedules and inventories. FlexLink's corporate development specialist emphasized this, when interviewed:

> *"This way we give the supplier the possibility to produce with high efficiency, but then they would keep them in their warehouse and we*

gradually empty their warehouse. […] This is a good system because in most cases we need the items as urgent deliveries, and they have them in their stocks. Then when we have a forecast plan, we discuss it with our suppliers so that they can see that, for instance, every fourth or sixth week FlexLink is planning to order them. But then, if we all of a sudden have a huge order from a customer that we didn't know about, then we can supply from our suppliers' stocks."

The main approach that FlexLink's product quality group employs when dealing with the suppliers is that if FlexLink needs to reduce the price of an item manufactured by a European supplier, FlexLink should discuss it first with the supplier, and if the parties are not able to work it out, then FlexLink should have the product manufactured in China. However, the approach employed by FlexLink's Product and Supply division requires that suppliers proactively implement price reductions whenever possible. If at any given point FlexLink needs to reduce the prices of an item, it is already assumed that the supplier cannot reduce the price any further. Hence, in some cases, instead of cooperating with the supplier for cost reductions, the possibilities of moving the item to China would be analyzed. FlexLink's corporate development specialist emphasizes the importance of this approach for working with the suppliers in the long run:

"If they only reduce the price when we ask them to, it means that they have robbed us all the time until when they agree to reduce the price. If the price decrease was possible, why didn't they do it earlier?! […] But of course one has to be flexible. Sometimes we go to a supplier and tell them that we are moving a certain product. They would try to stop us by reducing the price, but then we say that we are moving this product, but you should look at your other products and proactively reduce the prices if you can. […] However, moving a product away from a supplier is mostly ammunition for the next year's negotiations. But a lot of things come up when discussing problems. Sometimes it is about investing in a new fixture, sometimes about buying a new, more efficient tool, sometimes changing something in the design, and so on. This happens a lot."

FlexLink usually engages in a lot of collaboration with its suppliers when developing new products. FlexLink's product quality manager describes how central this collaboration is to FlexLink's approach toward its supplier relationships:

"When you are choosing a supplier, it is very important to figure out what they are capable of, if you can have a good dialogue with them, can they be proactive, and so on. Some suppliers, as soon as they give the quote they ask questions. If they don't give any feedback or don't ask any questions, this is already a warning."

Geographical closeness to the suppliers is considered important for FlexLink. As a result, most of FlexLink's collaborative development takes place in its relationships with suppliers that are located in Sweden. For instance, link and pivot products are among the most complicated FlexLink products, and these require elaborate technical discussions. This is why FlexLink only leverages its relationships with IM2 and IM4 to develop and manufacture those products. Interaction with the Hungarian and Estonian suppliers is relatively high as well.

Overall, FlexLink's interactions with the Chinese suppliers are not as extensive as with the European suppliers. One reason for this is that, given the geographical distance, FlexLink mostly uses Chinese suppliers for products that are not as complex as the products manufactured by the European suppliers, and this reduces the need for close collaboration between FlexLink and its Chinese suppliers. Nevertheless, FlexLink has a much better dialogue with its Chinese suppliers now than when they started there. FlexLink's product quality manager admits this, and emphasizes the important role of FlexLink's China Sourcing unit in facilitating the dialogue with the Chinese suppliers, pushing the Chinese suppliers to give feedback, and making sure that they have understood everything:

> *"We have some suppliers in China with whom we have a good dialogue before we start the production. During the quoting process, they say that this we cannot guarantee or is it possible to change like this or that. This dialogue is very important, because it takes away a lot of uncertainties. And today, I think most of the suppliers we have in China are like that, but there are still some with this problem.[…] I have seen many Chinese companies that say that 'we don't know anything about this, but we want to learn,' and they are actually asking us for this type of information."*

With the European suppliers, FlexLink's strategic purchasers have direct contact (visits, telephone, emails, etc.), while for the Chinese suppliers the contact is via FlexLink's China Sourcing unit, which serves as FlexLink's extended eyes and ears there. FlexLink's discussions with the suppliers usually includes quality, price, and supply issues. For the supply issues, FlexLink's logisticians utilize the strategic purchasers as their main reference for commercial and technical matters. The strategic purchasers coordinate these discussions between FlexLink and the suppliers.

In most of these supplier relationships, various types of problems arise continually that need to be solved, some of which are reported by FlexLink's customers. These tend to be the problems customers face when receiving or using FlexLink's products in their own production logistics systems. Another set of problems relates to defects in the products that are discovered before reaching the end customer. Those problems show up in the form of complaints filed in FlexLink's complaints system, called "Nilex." Those defects are discovered during the preassembly in the workshop of FlexLink's sales unit or by FlexLink's suppliers that use other FlexLink products as components for assembly into larger systems. Complaints are sent to a certain email address, and each is automatically registered with a case number. Then a coordinator at FlexLink handles the complaints by directing them to the relevant people. If the complaint has something to do with the design, it would be forwarded to the designers; if a supplier has to deal with the complaint, it would be sent directly to the relevant supplier; and if it needs to be taken care of by FlexLink through its supplier relationships, it is sent to FlexLink's product quality group.

Each of these types of problems can be handled different from the others. For some problems, FlexLink (or maybe FlexLink together with some suppliers) have to react fast, while for others a more long-term perspective might be needed. For some problems, the manufacturing processes may need to be adjusted, while others require adjustments to the tools. Solving some problems might involve trying a new raw material or compound, while for others the product design has to be altered. Some of the problems take place during the manufacture of a product, while others arise while the product is still in the development phase. Not all problems are related to product quality;

the source of many problems is in the supply area, when, for instance, large orders with tight deadlines come in from the sales group.

FlexLink uses the help of its suppliers in solving various technical problems. According to FlexLink's product quality manager, this is an essential part of FlexLink's method of operation:

> *"This is one of FlexLink philosophies, that we don't have any manufacturing knowledge or expertise; we are buying that. This is why we have the suppliers, and they should be professional in manufacturing. So, for that reason, it is very important that we have a good dialogue."*

This dialogue is vital in FlexLink's business, because problem-solving in FlexLink's relationships is usually mutual. One of FlexLink's strategic purchasers, when interviewed, emphasized this mutuality by highlighting the reliance of FlexLink on the knowledge of its suppliers:

> *"The designer sits and designs the product, but does not always have the understanding of how this should be produced. There have been cases where we design something and then the supplier says that if we change it in this way it would be more cost-effective and easier to produce. […] We don't say [to our suppliers], 'Look, we have a problem, go and solve it!' We say, 'OK, how should we solve this?' And they say, 'Maybe we should try this.' And we say, 'OK, go ahead and try that.' And they say, 'OK, it costs this much extra.' And we say, 'OK, let's see the results."*

FlexLink not only relies on the suppliers' knowledge for solving its problems, but also approaches those problems by cooperating with the suppliers in Europe, U.S., or China. For example, one of FlexLink's design engineers, when interviewed, pointed at the close collaboration of FlexLink's China Sourcing unit and the suppliers in China:

> *"Our China sourcing manager and his team usually have a lot of technical discussions with the suppliers in China, and it is hard to say which part of the problems are solved by them (FlexLink's engineering group in China) and which parts by the suppliers."*

Furthermore, there is an important element in these attempts of learning to mutually solve problems with the suppliers. FlexLink's engineers learn from the suppliers how the processes work and how the quality issues can be dealt with, and the suppliers learn more about the important details related to product design and what role each detail plays when the product is used. For example, when PE4 undertook manufacturing of a group of plastic extrusion guiderails after FlexLink abandoned its relationship with PE2 in 2011, PE4 had various problems starting the production. The problems were due to this being PE4's first time working with FlexLink. As a result, FlexLink got involved in solving some of PE4's production problems, and during that process a couple of FlexLink engineers learned a lot about master batches and machine velocity, as well as what kind of effects those settings can have on the end product. To approach those problems, both parties had to investigate and learn more about the atomic structures of the guiderails.

4.1.2 PRODUCTION TOOLS

Most of FlexLink's suppliers use production tools to manufacture FlexLink's products. The tools related to some technologies are more expensive to own and maintain than others; some are more uniquely usable for FlexLink's products while some others are more generic; and some are more easily moved from one supplier to another, while others are almost impossible to use when the relationship with the supplier that uses the tool is terminated.

Plastic injection-molding tools and die-casting tools are the most expensive tools used for FlexLink's production at its suppliers. The cost of purchasing an injection-molding or a die-casting tool is around 500,000 SEK, and they are FlexLink-unique. IM2, IM3, IM4, and IM6 are the biggest users of injection molding tools, while DC1, DC2, and DC4 are the largest users of die-casting tools. FlexLink pays for designing and manufacturing most tools of both of the above types, and makes them available to its suppliers to use for FlexLink production. In some cases, FlexLink is involved in the design and manufacturing process for the tools, while in other cases the tools are designed and manufactured in cooperation between the supplier that uses them and a sub-supplier that designs and manufactures them. In the latter cases, which are significantly less common, FlexLink is only financially involved in the tool development process. Regarding the expensive tools, FlexLink sees them as investments, meaning that in case FlexLink someday decides to have another supplier produce those products, the company will not need to buy again the tools needed for that production.

Aluminum extrusion is another frequently used production technology for a number of FlexLink's products, including profiles, beams, conveyor support legs, etc. AE1, AE2, AE3, and AE4 are the largest FlexLink suppliers that use aluminum-extrusion tools for manufacturing those products. Those tools are relatively low in cost (around 20,000 SEK on average), and the suppliers own the tools. In some cases, the suppliers manufacture the tools in-house (for example, AE4), and in other cases they order them from tool manufacturers.

FlexLink has a couple of suppliers for plastic extrusion. The most important ones are PE1, PE2, PE3, and PE4. Manufacturing processes related to plastic-extruded products are expensive; however, due to the specific characteristics of the tools, the suppliers own them. For vacuum molding, FlexLink has one key supplier, which is VM1. The products manufactured using this technology are produced in low volumes, but the manufacturing processes require large and expensive tools, so FlexLink invests in and owns these tools.

The manufacturing processes related to stainless steel die-casting (SS1) and stamping (MS3) do not require sophisticated tool-making processes. SS1 makes its own tools in a manual process. Every once in a while, FlexLink places orders for new tools at MS3, and they sometimes make them and sometimes order them from a sub-supplier. Because the tools related to these two technologies are not very expensive, owning them does not have a high priority for FlexLink, but in some cases FlexLink will make an ownership investment.

For less expensive tools, if for any reason FlexLink's relationship with the supplier is to be terminated, FlexLink can simply buy new tools. This is because any new supplier would have to make modifications to the tools to be able to use them, and, given the relatively cheap price of those tools, it is not worth the money to transfer and modify the existing ones.

FlexLink has at least three regular meetings per year with every supplier to discuss issues related to the tools they use. In such meetings, primarily the high-volume tools and the ones that need the most maintenance are discussed. Besides those meetings, if any problem occurs with the tools, suppliers contact FlexLink directly. It is vital for FlexLink to solve such problems quickly, because if a tool has a problem, the supplier cannot continue manufacturing the products.

The responsibility for maintenance of the tools falls on the suppliers that use the tools, whether FlexLink has invested in the development of the tool or the supplier has paid for the tool development. In most cases, even when a tool FlexLink owns cannot be used in a different setting for a different supplier, FlexLink compensates for the cost of the tools over time by breaking down the cost into additional margins on the products bought from the supplier that uses the tool.

The users of the tool (FlexLink's suppliers) take care of the small maintenance of the tools, including the daily maintenance tasks such as cleaning, changing the small broken parts, etc. If maintenance of a tool requires a major repair, the tool is sent to the tool manufacturer. Major repairs include broken tools, or if there are complaints about the products made using the tool and large adjustments are required, etc. The cost of solving such problems can vary between several thousand SEK to maybe hundreds of thousands of SEK. FlexLink pays the costs of all maintenance operations, except (in most cases) for the daily maintenance, and it is usually FlexLink Sweden that makes decisions about whether a tool needs to be replaced by a new one (based on the information they receive from the supplier that uses the tool). For situations in which the cost of solving the problem with a tool is higher than 10,000 SEK, the supplier involves FlexLink in the process. If the cost of solving a problem is less than that threshold, the supplier bills FlexLink directly without discussing the issue.

Some of FlexLink's suppliers that use a large number of tools – for example, IM2 – ask FlexLink to directly reimburse all costs related to its tools. Others that use more limited varieties of tools for FlexLink (such as DC4) pass on those costs via the price they offer to FlexLink. In some cases, FlexLink only partly owns the tools; for example, aluminum- extrusion tools, which are still FlexLink-unique tools. In such situations, FlexLink pays for a part of the cost of the tool in the form of additional margins when the new product is delivered; however, if the tool is worn out, the supplier must pay to replace it.

Development of the tools

FlexLink's suppliers sometimes need new tools to replace the old ones, and sometimes need new tools when starting to manufacture new products. In the first case, the supplier is primarily responsible for maintaining the tools and ordering new ones if needed. In the latter case, when developing a new product, FlexLink asks suppliers to make or order tools needed for manufacturing those products. In cases of outsourcing tool manufacturing, the suppliers are in direct contact with tool manufacturers. In some cases, FlexLink has little to do with the tool manufacturers, while in other cases, FlexLink participates in numerous discussions that take place between the supplier and the tool manufacturer developing the tools. For some tools, FlexLink only provides the product designs and asks the supplier to make or order a tool that can be used to manufacture that product, while for other tools, FlexLink defines detailed specifications as well, such as how many cavities the tool should have. In still other cases, FlexLink may even specify

more requirements for the tools, such as certain cooling- down processes used during manufacturing.

FlexLink gets more involved with tool manufacturers in Sweden than those located in the rest of the world. For example, the development of the tools used for manufacturing FlexLink products by its Chinese suppliers are technologically more simple overall. This is also true for a large share of FlexLink products produced outside of Sweden. In Sweden, FlexLink's very close and collaborative relationships with a few suppliers that use expensive tools have made involvement in tool development for those suppliers' processes important for FlexLink. This is primarily the case for plastic injection-molding tools. The plastic injection-molded products manufactured by IM2 and IM4 in Sweden are among FlexLink's most technologically complex products. Therefore, it is critical for FlexLink to be involved to some extent in the design and manufacturing of the tools for those products. Below, FlexLink's quality engineer responsible for tools expresses the importance of IM2's relationship with its main tool manufacturer (TM1):

> *"IM2 is our number-one supplier. They are very qualified. They have been with us for almost 30 years. A lot of [new] products end up in IM2, and IM2 only (maybe 99%) uses TM1 tools. These two have a lot of collaboration."*

Furthermore, IM4 produces the high-volume links (chains), for which they also use tools manufactured by TM1. The tools needed to produce the links are also very complicated. FlexLink and IM4 have tried in the past to produce those tools in Taiwan, but the Taiwanese manufacturers did not succeed in terms of product quality.

To benefit both relationships above (FlexLink–IM2 and FlexLink–IM4), FlexLink maintains a close relationship with TM1. Sometimes, when a new product is being developed, FlexLink orders the tools required directly from TM1, and sometimes through IM2 or IM4. The two plastic injection-molding suppliers get involved in the discussions between FlexLink and TM1 to give input on the requirements from their production system's viewpoint. They also provide accounts of their experience of using such tools to help solve problems related to the design and manufacturing of the tools. TM1 has been producing tools for FlexLink since the 1980s, and hence they have a lot of experience with FlexLink products.

All tools are designed by the tool manufacturers and in some cases by the tool manufacturers' suppliers in China, and FlexLink has either high or limited involvement in their development. For example, FlexLink designs a new link and sends the design to IM2. Then IM2 contacts TM1 for a quotation, adds a margin, and sends the quotation to FlexLink. FlexLink only provides some basic requirements; for example, how many cavities the tool should have. Then TM1 designs the tool and has its Chinese supplier manufacture it and send it to Sweden. In some cases, even the design is done in China under TM1's supervision, provided by a TM1 engineer employed in the Chinese supplier's factory. This also makes it very cost-efficient for FlexLink and IM2 to buy from TM1. TM1 is highly involved with its Chinese supplier to ensure the quality of the tools it manufactures. Later, during the sample production and testing, FlexLink gets involved and also gives feedback on the tools. Sometimes these problems are approached in joint meetings between FlexLink, IM2, and TM1; sometimes these meetings take place before the sample production, and sometimes after it. On occasion, representatives from FlexLink, IM2, and TM1 go to China and visit TM1's

supplier, and try to solve problems there, suggest changes, and so on. They do this because they can effectively make the changes there and save a lot of time and money. In addition, sometimes IM2 and TM1 would deal with the problems themselves, with or without going to China.

4.1.3 FLEXLINK'S VIEW ON STRATEGY DEVELOPMENT

"FlexLink is a small but very global company," expresses FlexLink's corporate development specialist, to show the context in which FlexLink's strategies are developed. In 2011, FlexLink decided to add a position to its organizational chart, including a corporate development specialist. The intention was to have someone who offers food for thought and input to corporate strategy development and strategic decision-making. FlexLink's previous director of its supply chain group was selected for this position. FlexLink considers three categories of issues and decisions as strategies: the corporate strategy, the local business plans for each market, and the product and innovation strategy.

FlexLink uses four-year strategy periods, and the above-mentioned strategies are defined for each period. The budget is defined for each year, with a horizon of two additional years under different scenarios and broken down into various aspects, such as sales and operating results.

Each of FlexLink's local units defines a local business plan every year. Those plans are also updated annually, with a horizon of two additional years. The plans include goals for the local sales units, and specify what each local unit needs to do and achieve in the coming year and within the two years following that. Those plans are finalized after the corporate budget is set, and take the corporate budget as a starting point to identify what is achievable and what is not. Therefore, local business plans are usually developed at the end of each year, or at the beginning of the year when the plan must be put into practice. The local business plans are operational; they focus on activities that need to be undertaken, rather than the long-term ambitions and goals of the unit. In addition, those plans are very sales-oriented; they emphasize what sales goals the local unit must achieve and which short term strategies they need to undertake for their local markets in order to achieve those goals.

Other types of strategies are decided on lower organizational levels of FlexLink's group management, and are not documented as strategies; instead they are discussed more as directions and decisions. In sourcing, some examples of major decisions of FlexLink's Product and Supply division are setting up the sourcing unit in Shanghai, expanding sourcing in China, having two suppliers for all tool-dependent products (technology-based multiple sourcing), and moving the warehouse from Germany to Poland in 2012.

Another example of such major decisions concerns sourcing integration with the Coesia Group, which owns FlexLink and is a major producer of packaging machines. Since Coesia Group acquired FlexLink in 2011, the purchase of catalogue items such as motors, sensors, fasteners, and bearings for FlexLink have been consolidated with similar purchases of the Coesia Group, since those items are not FlexLink-unique. This is in line with a decision from senior management to align purchasing efforts and centralize negotiations between FlexLink and the rest of the Coesia Group.

FlexLink's corporate development specialist emphasized the opportunities that this decision has brought for economies of scale in the purchase of those items. In some cases, the items that needed

to be consolidated were not identical, but could be interchanged. In other cases, FlexLink has been able to use its relationships with suppliers to secure advantageous deals on the items targeted for consolidation. For instance, regarding the purchase of a certain item, FlexLink and the rest of the group had the same supplier for that item, but among all members of the group FlexLink obtained the best deal with the supplier. Therefore, it was decided that FlexLink would take the lead and negotiate a common deal with the supplier on behalf of the whole Coesia Group. Therefore, as a result of this major change (integrating purchasing of certain items with the Coesia Group), FlexLink's business volume with some suppliers has been reduced, while with others it has increased.

Corporate development and planning for the future

In autumn of 2012, a workgroup was assembled within FlexLink to develop preliminary strategies and guidelines. The workgroup consisted of the corporate development specialist as the chairman, plus two members selected from the group management team and two members from senior employees at FlexLink (one with a pure sales focus, and one with a product and sales focus). The workgroup held a series of one- or two-day workshops over a five-month period.

FlexLink's global and local offerings were among the most important topics on the agenda of the workgroup. Each local sales unit of FlexLink focuses on a certain set of FlexLink products, and only a small portion of FlexLink's total offerings is common to all local units. What FlexLink sells in Japan is different from what it sells in the U.S. Therefore, according to FlexLink's corporate development specialist, this is one of the most challenging strategic decisions that needs to be taken by FlexLink, and expanding the intersection between the offerings of the local sales units can be "a source for growth without [a need to invest in] R&D".

This is due to the great importance that FlexLink attributes to expanding business with its existing customers. One concept that is used in relation to this policy is the so-called "wallet share," or the percentage of total procurement expenditure of a customer for which a given supplier is responsible. FlexLink, by focusing on its "wallet share" for each customer, considers it more important to expand business with its existing customers than to invest in increasing the number of customers. When interviewed, FlexLink's corporate development specialist mentioned a few reasons for this:

> *"We want both; we want to increase both our market share and share of wallet. But in some markets, what we see is that the marginal return of a Euro invested will be higher if we invest it in an existing customer, because to find a new customer and to convince them to use FlexLink's products instead of someone else is hard work. But with a customer you already have a relationship with, to take the next step and to offer a bit more is more rewarding. Maybe since 10 years ago when we started with that customer, they have evolved now and are ready to buy a bit more from us. You have to work with both; growth is not only a function of market share, it is also a function of wallet share."*

FlexLink's geographical coverage was also discussed in those workshops. In those discussions, the aim was to define what kind of a footprint FlexLink should have with regard to the diversity of the markets around the globe in which they are present. Innovation in product development was

also discussed as a central feature of FlexLink's strategy. Regarding innovation, the discussions in the workgroup primarily covered the product development areas FlexLink should target, rather than what must be achieved. Moreover, sustainability was also discussed as an important dimension of FlexLink's strategy.

The workgroup concluded by updating the vision and mission, defining a theme for the strategy period 2013–2016, formulating FlexLink's market position, identifying eight strategic initiatives with a number of sub-areas for FlexLink to focus on, and setting a number of financial targets based on the expectations of FlexLink's owners. Those conclusions were then sent as suggestions to FlexLink's senior management for final approval, eventually and officially being adopted as FlexLink's strategies.

Afterwards, the strategies were sent to the local units for implementation. In all of the units, the strategy was presented, communicated, and explained in the workshop that each local unit had assembled to discuss the strategies, their local impacts, and the ramifications for the business plan of the local unit. In those discussions at each unit, the member of FlexLink's group management team who is responsible for that unit was also present.

The gradual, ongoing transition to China

FlexLink's impetus to source in China and expand its sourcing business there has been based on an important strategic initiative. Developing new products for sourcing in China and transitioning existing products to China is performed with a long-term perspective as well as with regard to the item-by-item procurement cost analysis. Every calendar year, the Product and Supply division receives a procurement savings goal from FlexLink's senior management. According to the director of the supply chain group:

> *"That's pure top-down. You can say it's 'a number' of MSEK. There are no decimals. It's set: It's a challenge that my boss and I get and we have to sort of accept it or of course negotiate it. We have to validate it and we have to look at this number in relation to our total procurement spend."*

However, in the past couple of years, it has been more of a bottom-up process; an achievable number was agreed upon by the Product and Supply division's management and taken to the board of directors for confirmation. FlexLink's director of the supply chain group explains this process:

> *"Last year my boss called me in December, when I was at the airport in Amsterdam on my way to Malaysia, and asked me, 'What should be our number for the next year?' And I said like, 'Ah! You tell me!' And so we decided to stick to the numbers from last year."*

In order to make such a decision, the Product and Supply division considers factors such as the budget, the items on the list of candidates to be moved, and the opportunities that seem reasonable for moving more items to emerging countries.

The Product and Supply division then validates this goal by viewing it as a percentage of its procurement costs from the previous year. For 2011, this goal was around 2–3%, which was unchanged from 2009 and 2010. The director of the supply chain group said he believes that it is natural to have lower goals every year. The reason for this is that when FlexLink started in China,

it started by picking the low-hanging fruit: “because cherry picking works fine in the beginning, and then it becomes more and more [difficult],” according to FlexLink’s director of the supply chain group. The simplest items to move, and those items with the biggest possible procurement savings if moved to a supplier in China, were moved first. However, as time passed and more items were moved to China, the items remaining in Europe are considered to have less potential for large procurement savings: “Now the payoff is maybe three years, instead of one year as it was at the start.” This has been one reason for keeping goals almost the same for 2011 and 2010 as they were in 2009.

Another reason is the lower demand in 2009 as compared with 2010 and 2011. When volumes are higher (as in 2010 and 2011), the same procurement savings goal means a lower percentage of total procurement costs that year compared with the previous year. This greatly affects the Product and Supply division’s expectations of an achievable goal for the coming year, since their calculations take the actual volumes from the previous year into account. For instance, in 2010, they calculated the goal based on 2009 volumes and, since these volumes were lower than the volumes in 2010, if they set the same procurement savings goal for 2010, this would mean a lower percentage of its total procurement expenditure in 2010 than in 2009. This is a balancing factor against the above-mentioned “low-hanging fruits” effect.

A key tool for achieving the annual procurement savings goal is the transfer of items from European suppliers to China. As part of FlexLink’s regular business planning, the Product and Supply division has created and continually updates a list of candidate items to be considered for transfer to China.

The director of the supply chain group and the manager of China Sourcing usually begin the process of updating this list by reviewing all the items in the list that are being sourced in Europe, and sorting them in descending order of volumes and values. Beginning at the top of the list, each item is checked for potential as a transfer candidate. At this point the China Sourcing team becomes involved, reviewing each candidate item with regard to the information provided in the product catalogue and the drawings, and in interactions with FlexLink’s engineers in Sweden. They analyze all candidate items based on type, the type of production processes they require, and the special needs of each, such as tolerances, special painting requirements, and so on. A list of 30 to 50 items is usually compiled. Then the director of the supply chain group and two strategic purchasers (who are more knowledgeable about the technical characteristics of each item) refine and finalize this list in Sweden to initiate the transfer process.

When this list was updated in November 2010, the initial list of items made by the China Sourcing team consisted of some 50 items, which was reduced to 30 at the FlexLink headquarters in Sweden. Up to the time of this interview (August 2011), three of these transfers had been implemented, and eight to 10 were under implementation, while some 15 had been withdrawn from the list of candidates or transferred to other non-Chinese suppliers after further analysis, because options were found that were more favorable than transferring these items to China.

As shown above, in some cases procurement savings can be achieved by alternatives other than transferring the items to China. If the amount of savings from transferring to another setting is almost equal to the savings that could be achieved by transferring the item to China, the relative

proximity of the other settings (for instance in the Central and Eastern European countries) makes these alternatives preferable. Shorter lead times and transportation costs are among the advantages of such alternatives that FlexLink considers most critical. For example, a number of injection-molded items that were being analyzed for possible transfer from a European supplier to IM3 were instead transferred to a supplier in Hungary after a good price offer, because of better lead time and transportation conditions, the lower risks involved, and the better possibilities for interaction with the supplier.

In many situations, cost-wise, there may be two or three competing bids, giving FlexLink the chance to choose based on a number of considerations beyond price. In some cases, they also try to encourage its existing European supplier of the focal product to lower the price by threatening a possible transfer of the product to China.

Analyzing transfer opportunities almost on an item-by-item basis has sometimes limited FlexLink's view of other aspects. In summer of 2011, for instance, FlexLink realized that they were only buying one connecting strip from one of its European suppliers. This was *"an embarrassing situation,"* as explained by the director of the supply chain group:

> *"Although it was not a very high-volume purchase, we still wondered, 'Why aren't we buying this from MS3*[9]*?' And then we said, 'Just do it,' and we did it."*

Today, FlexLink follows a continuous expansion strategy in China. The company tries to expand its points of departure for this analysis, and in some cases looks at item categories rather than individual items, according to the director of the supply chain group:

> *"If we see that one item looks very promising or if there are very similar items or if there are items that use the same tool but maybe with a different hole pattern or something, then we move the whole package."*

However, FlexLink is not yet at a stage in China sourcing where it is ready to set up a completely new product range from scratch in China.

4.2 FLEXLINK'S SUPPLY NETWORK DEVELOPMENT BEFORE 2004

Before 2004, FlexLink's supply network comprised mainly Swedish suppliers. The most important suppliers at that time provided FlexLink with the following technologies (anonymized supplier names are in parentheses): aluminum extrusion (AE4), aluminum and zinc die-casting (DC2, DC3, DC4), injection-molding (IM2, IM4), laser-cutting (LC1), machining and stamping (MS1, MS2, MS5, MS6), plastic extrusion (PE1, PE2, PE3), plastic raw material production (PR1, PR2), and tool manufacturing for injection molding (TM1).

A summary of the developments in FlexLink's supply network during the time period defined in the case description is illustrated in Figure 4-4.

[9] A sheet-metal stamping supplier of FlexLink in China.

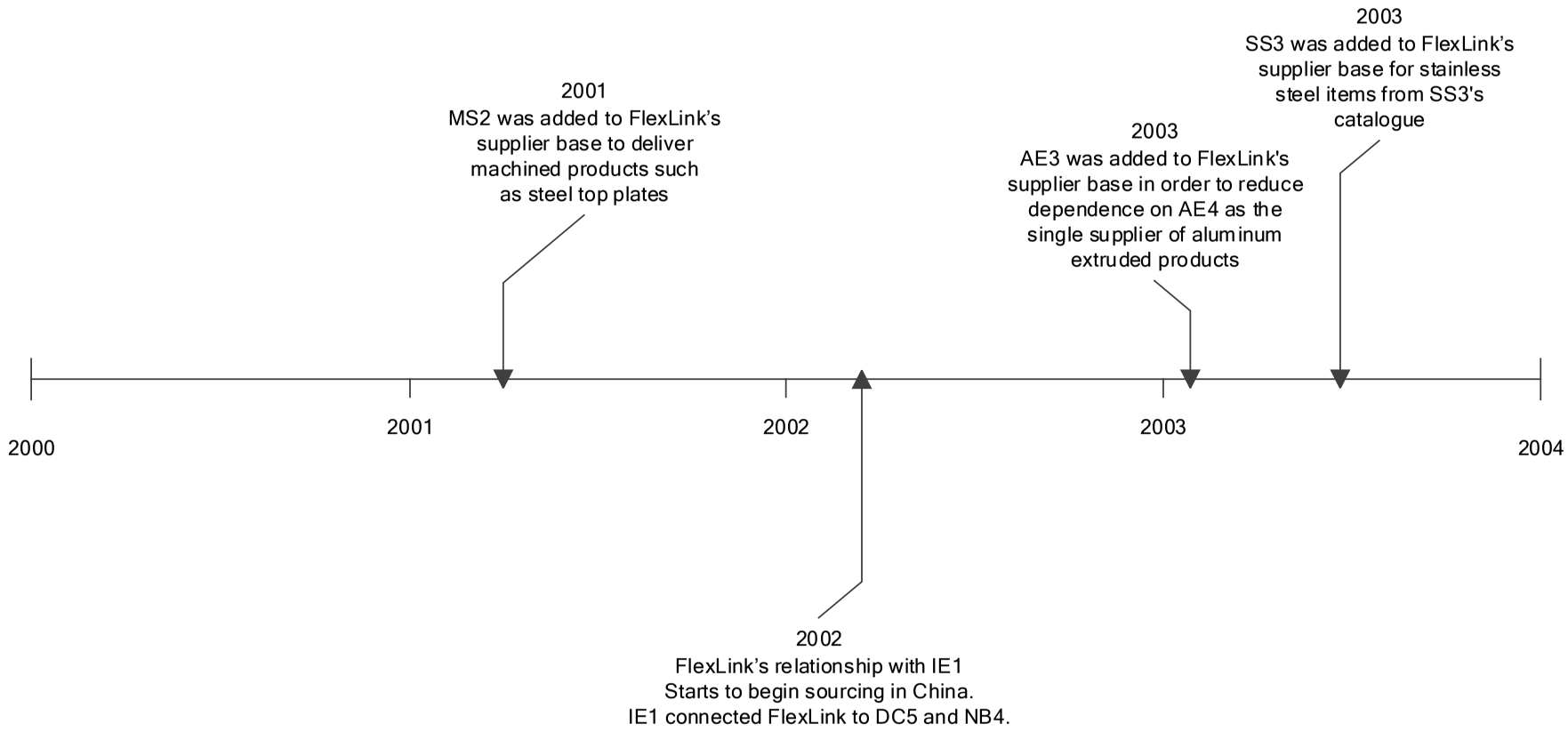


Figure 4-4: A summary of the developments occurring between 2000 and 2004

IM2 and IM4 are among the most important suppliers of FlexLink. They both produce injection-molded products for FlexLink, and contribute to a large share of FlexLink's total offering. One of FlexLink's product quality engineers describes the FlexLink–IM2 relationship this way:

> *"IM2 has been around since day one with FlexLink; they produced our very first prototypes (for the chains). More than 150 FlexLink injection-molding tools are at IM2. They have been working with our products for so long that the knowledge and expertise that they have is almost irreplaceable. [If we ever decide] to change from IM2 to another supplier [it] would be very risky. They also know that they are very important for us. We have IM4 too, but IM4 only have half of the volume, and have not been around for as long time as IM2 has been."*

Therefore, IM4 does not have as long a history with FlexLink as IM2, but its relationship with FlexLink is also important. FlexLink added IM4 to gain another supplier with injection- molding technology, because such products are critical for FlexLink. This means that IM4 can potentially produce the same products as IM2, but they do not. For example, IM4 produces the plain chains, which are high volume with the highest demand on a regular basis, while IM2 produces more custom-ordered and more specific chains. As one of FlexLink's product quality engineers addressed in an interview:

> *"So, IM4 is more of a volume producer, but if there is a problem with IM2, IM4 can take up the production of those items, because IM4 have the machines, and the tools exist at IM2's factory and can be moved to IM4's. This is not easily done, but it is possible. And of course also the other way round."*

By 2004, all of FlexLink's relationships with its important suppliers were still in place. IM2 and IM4 remained the most important injection molders for FlexLink, just as MS5 and MS6 still ranked as the machining suppliers with the biggest business volumes with FlexLink. A third important machining supplier, MS2, was added to FlexLink's supplier base before 2004. In 2004, around 75% of the business volumes in FlexLink's relationship with MS2 consisted of one product type: steel-top plates.

For all products requiring aluminum extrusion technology, FlexLink had only one key supplier, AE4. To avoid becoming too dependent on AE4, FlexLink decided to add a new aluminum extrusion supplier, AE3, to its supplier base. However, this did not result in a reduction of business volumes between FlexLink and AE4; FlexLink used the relationship with AE3 for new products with the same (aluminum-extrusion) technology.

Another important supplier in FlexLink's 2004 supplier base, which was not present in its 2000 supplier base, is SS3. Before 2004, FlexLink decided to add stainless-steel products to its catalogue. Such products can be used in pharmaceutical and food industries. At the time, FlexLink did not see stainless-steel products as a strategic product group. Hence, the firm looked for a supplier that could provide it with a variety of predesigned stainless-steel products, and found SS3. This relationship started with FlexLink choosing and purchasing a number of items from SS3's own catalogue. Those products were designed and manufactured by SS3, but branded with FlexLink's logo. They included certain models of guiderail brackets and feet for the conveyor

system. SS3 had the catalogue available for its other customers too, so that they could sell the same products with different branding to other customers as well. Still, it was beneficial for FlexLink to execute this deal, since they needed to have stainless-steel products to widen the scope of its offering. SS3 has other ranges of products made of regular steel too.

4.2.1 BEGINNING TO SOURCE IN CHINA

FlexLink's first purchases in Asia were made in the 1990s, when the company bought a number of injection-molding tools in Taiwan. This was mainly attributable to the interest of the company's board in making a purchase in Asia. In 2002, FlexLink decided to try sourcing from China. However, owing to the difficulties of coping with the local regulations and lack of business know-how, FlexLink decided to source its desired items via a Swedish import/export company (IE1) active in China sourcing. It started with connecting strips and later added more items such as square nuts to the total China business. DC5 and NB2 were the suppliers in China from which IE1 made the purchases for FlexLink during that period. Until the end of 2004, FlexLink's business in China did not experience much expansion, neither in business volumes nor in the technological complexity of the products involved.

In 2004, when FlexLink was considering cost-cutting activities, its business in China became an opportunity for the firm. FlexLink expected that some products could be sourced in China at a lower total cost, mainly for products requiring manual labor. However, energy is not cheaper in China; therefore, sourcing energy-intensive production activities such as injection molding in China was determined by FlexLink not to bring major cost-reduction advantages. Moreover, the Chinese government has direct control over the raw material prices, and kept steadily increasing those prices during the time FlexLink was considering an expansion in China sourcing. Hence, FlexLink decided to remain fairly conservative in its China sourcing.

At that time, there were multiple reasons and motives for FlexLink to expand its sourcing business in China. Financial reasons and FlexLink's major interest in lowering its costs of procurement were the main incentives, but not the only ones; since the company was owned by a private equity fund, it was important that as part of the brand they always look for new ways of cutting costs. The director of the supply chain group explained it this way:

> *"... because it's sort of trendy; companies should do it. [...] because it looks good!"*

China was not a completely new area for FlexLink. Starting a few years before, FlexLink had not only been involved with China in terms of sourcing (although through a middleman), but also its sales office had a presence in China, which saved the Product and Supply division from taking pioneering risks. No starting from scratch was required, which was a motivating factor for this offshoring effort. At the same time, having a middleman in its sourcing business in China was not a situation that FlexLink's managers wanted to continue for long, mainly because FlexLink felt the need to be closer to its suppliers, and this was not possible with a middleman.

In addition, since FlexLink was the market and price leader, the firm was under price pressure and had therefore raised its prices at a slower pace than its competitors. Its strategy was to keep its products more expensive than its competitors, but to shrink the price gap gradually. This required FlexLink to find ways to ensure maintenance of its gross margins, and one of these ways was

China sourcing. Besides, according to FlexLink's director of the supply chain group, sourcing in China in today's business environment seems to be *"the right thing to do"*; when attempting to sell the company to new investors is concerned, if one does not source in China, investors think that *"there is something wrong with you."*

In 2004, FlexLink's Malaysian unit recruited a Mandarin-speaking Malaysian man to start up the first direct sourcing activities in China. FlexLink's sales office in China is registered in a free trade zone in Shanghai in order to be able to transact business in U.S. dollars and take advantage of some tax incentives. However, it is physically located in downtown Shanghai.

The aforementioned Malaysian employee of FlexLink started a small sourcing office at the same location as the sales office. At that time, FlexLink's aluminum die-cast items in China were supplied (through the import/export agent) by another die-casting supplier, which was located far from Shanghai. Hence, FlexLink's newly started sourcing unit in China began the search for a new aluminum die-casting supplier in Shanghai, and found DC1. At the beginning, various managers and engineers from FlexLink paid visits to DC1. DC1 was a small company then, with approximately 100 employees and only a few die-casting machines.

In order to make sure that suppliers with the right capabilities for FlexLink could be found in China, FlexLink started its relationship with DC1 with a simple item, called an angle bracket. An "angle bracket" connects two beams in a conveyor system. The director of the supply chain group explained: *"It is a very simple finished product; you die-cast it, you take away the burrs (the sharp edges), put it in a package and ship it, done!"* At that point, DC4 was also responsible for manufacturing the same items for FlexLink.

After DC1's success in satisfying FlexLink's quality requirements with angle brackets, DC1 became solely responsible for manufacturing that angle bracket and two other types of angle brackets for FlexLink. These new brackets were components of the new product series FlexLink was introducing. From that point on, every year more and more products have been added to the exchanges between FlexLink and DC1. FlexLink's director of the supply chain group viewed this as the reason for this initial expansion of the relationship: *"We found that we get good quality and low cost, so we continued."*

Still, not only quality and the price tag matter to FlexLink and DC1, when it comes to the closeness of the two firms in this relationship. The manager of FlexLink China Sourcing believes that DC1 is a good supplier because they successfully supply to large firms in the automotive and furniture industries. Since DC1 is one of the first suppliers FlexLink has used in China, and at that time they were a relatively small supplier, *"having grown together"* is considered by FlexLink's supply chain group director as a major advantage to the relationship:

> *"I think we have a very good relationship with them, we are an important customer for them, and they know that we are there to stay, because I think many Western companies are quite opportunistic when they go to China to source. But I think we get very good service from DC1 and MS3*[10] *because they know we'll come back year after year, and our purchase orders are*

[10] MS3 is a machining supplier of FlexLink in China as described in the following sections.

steady, and they know they can rely on our business, as long as they perform. It has been working very well."

4.3 FLEXLINK'S SUPPLY NETWORK DEVELOPMENT BETWEEN 2004 AND 2009

By the start of 2009, most of FlexLink's high-volume supplier relationships had not undergone any major changes. Every year FlexLink introduces a new project that includes a variety of products, for which all of its high-volume supplier relationships are utilized in manufacturing new products. This has created a need for constant development in FlexLink's supplier relationships, and has helped in maintaining the above-mentioned high-volume relationships. The most important suppliers that were added to FlexLink's supplier base prior to 2009 include SC1, IM3, MS3, MS4, and ST1. This addition of suppliers to the supplier base caused four of FlexLink's supplier relationships – including those with IM1, MS1, and MS2 – to be abandoned by FlexLink. Most of the changes in FlexLink's supplier base have taken place in recent years, because of new technologies introduced during this period.

By 2009, China sourcing had become an important part of FlexLink's supply network management. The products made in China were distributed to the rest of the FlexLink network in three different ways. Some were produced and packaged in China, sent to FlexLink's International Distribution Center (IDC), and from there sold directly to customers. Others, such as particular models of side plates and steel tops, were produced in China in a generic way, so that they could be later altered by FlexLink's European suppliers and used in different platforms. Those items, after being produced in China, were sent to the IDC, then to the European suppliers for machining and modification, and then assembled into other products or packaged and sent back to the IDC for shipment to customers. The third group of items produced in China were sent to FlexLink's Malaysian assembly unit and inserted into other products. Those items were finalized and even painted in China before being sent to Malaysia, without any machining or adjustments taking place in Malaysia.

Between 2004 and 2009, FlexLink China Sourcing began to purchase a few cosmetic items such as signs, screws, and labels in China, accounting for just under 2% of FlexLink's China purchasing. The main motivation for purchasing those items in China was not only lower procurement costs, but also those items in some cases were needed for assembly into FlexLink components manufactured in China. Therefore, FlexLink considered it logistically more efficient for them to be bought directly in China.

A summary of the developments in FlexLink's supply network in the time period described in the case description is illustrated in Figure 4-5.

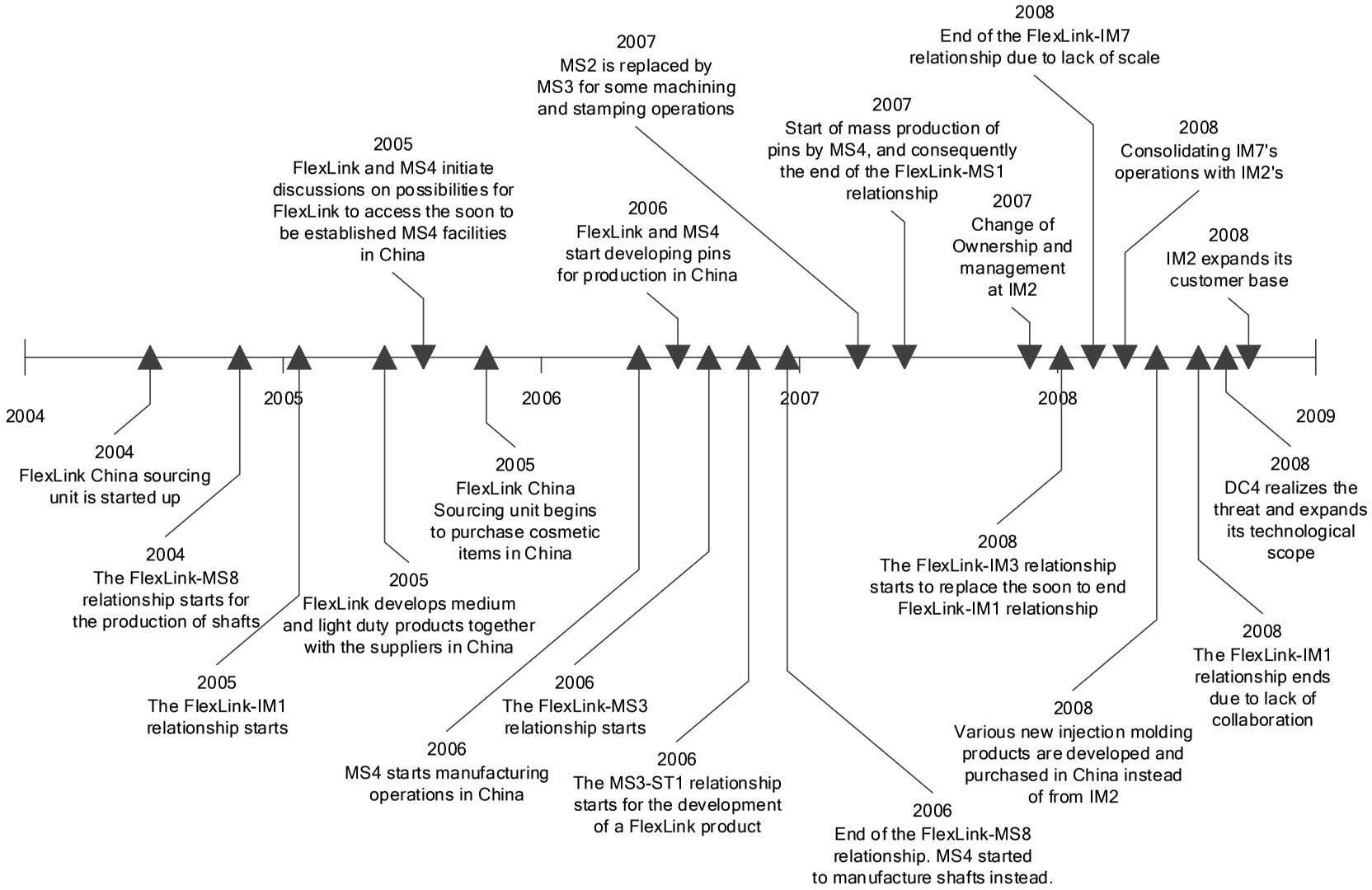


Figure 4-5: A summary of the developments occurring between 2004 and 2009

4.3.1 STABILIZING THE RELATIONSHIP WITH IM2

In FlexLink's relationship with IM2, the business volumes continually grew every year until 2008. From 2008 forward, these business volumes have remained relatively constant. One reason for this is that since 2008, FlexLink, when developing new products, has been looking for alternative suppliers that can produce the new items. Therefore, without reducing the business volumes with FlexLink, IM2's share of FlexLink's total injection-molding business has declined. At that time, FlexLink's profitability in relation to injection-molding products was decreasing, while IM2's profitability was growing. FlexLink and IM2 discussed the issue and assessed possibilities for reducing prices. IM2 agreed to reduce prices, but asked for a six- month extension of the existing contract; this was time that FlexLink did not have. Therefore, FlexLink started to put pressure on IM2 for price reduction, which negatively affected the atmosphere of the relationship. In parallel, the ownership of IM2 was in the process of changing from a family-owned business to an investor duo, and that made the interactions between the employees of the two companies more formal – or, as FlexLink's corporate development specialist put it:

> *"It became more professional, but less friendly. It is good and bad that they have become more sort of professional now, because changes take a longer time and they would charge us for everything. […] They are more rigid; it takes more time to change this. Because they know that we have squeezed them for their margins, and now if we want to change something they want to run the numbers [and ensure that it is going to be profitable] before they accept it. They do this to see if they can do the change without any price change, or if they need to charge us with markups."*

At the same time, FlexLink's relationship with an injection-molding supplier in Denmark (IM7) was coming to an end, due to lack of scale in that relationship. FlexLink's plan was to consolidate those supplies with IM2 and IM4. FlexLink used this major volume increase in its relationship with IM2 to make price decreases possible. Before that consolidation, FlexLink and IM2 did not have a very detailed contract, but during the consolidation both parties realized a need to put a more rigorous contract in place. They both invested a lot of time in negotiating the contract and pricing, in which FlexLink commits to certain issues, such as inviting the supplier to quote on all of the products that match the supplier's capabilities. With that contract, FlexLink made an "assortment commitment" to IM2, rather than formally committing to certain volumes to be purchased; meaning that FlexLink promised that its business with IM2 would not decrease due to moving products to other suppliers, but with regard to market fluctuations they may also fluctuate the volumes ordered.

Additionally, FlexLink's share of IM2's total sales had been reduced since 2008 (from around 60% before 2008 to about 35% in 2013). The reason was that, encouraged by FlexLink, IM2 had since expanded its customer base. In 2008, FlexLink discussed this issue with IM2 and asked them to find other customers too. FlexLink's concern was that in the event that FlexLink ever faced difficulties in purchasing considerable volumes of items from IM2, IM2 would not be able to survive and help FlexLink overcome the difficult situation. FlexLink's director of the supply chain group addressed this concern:

> *"We wanted them to find other customers too, because we were afraid that if we struggle, they would go bankrupt. […] We told them that we are*

happy that we are growing and you are growing with us. But you need to do something about relying so much on us. […] If we run into trouble, they need to have some quick alternatives. […] So there was no threat, it was more of a push: You need to do something about it!"

The interests of the new ownership of IM2 were very much in line with this suggestion of FlexLink. IM2 created a customer base expansion plan, and added three new customers. This has reduced the amount of attention IM2 would devote to FlexLink's business. FlexLink's corporate development specialist points at this:

"Because when you are attracting a new customer you have to invest a lot in convincing them to work with you, learning about their products and setting up the production. We could feel some of that, but in the end, I think it is good for FlexLink that IM2 has those other important customers, too. […]

During the period when this issue was being dealt with, the cooperation between FlexLink and IM2 was not as smooth as in the past. But after a while, after the agreements were made and the situation became more stable, strong cooperation between the two firms was resumed. FlexLink's engineers working with product development now have a strong preference to work with IM2 on new products, because IM2 staff know FlexLink products well and they are very skilled in injection molding. Furthermore, FlexLink's engineers feel that they are very close with IM2 engineers and can easily cooperate with them. IM2 also has very close relationships with the tool manufacturers that FlexLink considers essential for manufacturing its products with high quality.

FlexLink and IM2 continually discuss opportunities for price reduction, but given IM2's high labor costs, FlexLink considers cost-reduction possibilities with IM2 to be rather limited. FlexLink owns the tools that IM2 assembles on its machinery for manufacturing FlexLink items, and those machines are operated by IM2's employees at IM2's cost. FlexLink's concern is that if the tools are not utilized efficiently enough, IM2 primarily shoulders the additional costs because the price is not increased in such situations, and that is troublesome for the relationship.

4.3.2 Replacing some supplier relationships with new Chinese ones

Of all the major changes that took place between 2004 and 2009, perhaps the most important driver was FlexLink's expansion of China sourcing. This is also seen in FlexLink's investment in its China sourcing unit. In 2005, owing to the increasing number of China sourcing projects, four new employees – two project engineers, one logistics officer, and one quality inspector – were recruited for the China Sourcing unit, all of whom worked with all suppliers and administratively reported to FlexLink Malaysia. The organization of the China Sourcing unit went through a number of major changes over the years until 2009, when it became a direct subsidiary of FlexLink's Product and Supply division, reporting to its Swedish headquarters.

"Drive units" and "idler ends" are two of FlexLink's most important products, used in almost all production systems designed by the company or by its customers. Before 2005, they were produced in only one size, large. For many years, FlexLink had received requests from various customers for more compact versions of these items, in order to work with lower speeds and lighter loads. A lighter drive unit and idler end would also use lower quantities of raw materials and

lighter-duty bearings, making them cheaper and more suitable for customers that were not willing to pay for an unnecessarily expensive product.

For this purpose, smaller versions of idler ends and drive units were designed with different spacer and shaft sizes, and a new side plate was designed that could fit all three different sizes: two new types of idler end and 16 new variants of the drive unit. There was a challenging decision to make: Where should the new items be produced? This decision arose concurrently with FlexLink's first attempts at China sourcing, and FlexLink saw this as an opportunity to expand its China sourcing by starting the production of these new items all at the same time, in China.

The director of the supply chain group considered it a more risky decision to start with those new items in China than if FlexLink had decided to move production of a 10- to 15-year-old item there. In the second case, FlexLink could have taken its experience and clearly defined product specifications to the new suppliers *"and just tell them do it!*", while maintaining parallel production in Europe to mitigate the risks. These were both important products to the performance of the conveyor systems, and there was a fixed launch deadline. All of these issues increased the complexity and risk of taking this new product development step in China rather than in Europe. However, despite these complications, FlexLink made this decision not only owing to the lower cost incentive, but also to its general interest in increasing the scale of sourcing operations in in China. The director of the supply chain group explained it this way:

> *"Now we have a strategy to source in China. We have established a unit for it, so now we have to use it; if we never dare to use it, we might as well close it."*

FlexLink moved a number of production tools to China, and bought a number of new tools (for side plates and injection-molded parts) there in order to be able to produce all the required items in the new product package in China. With this solution, the company managed to avoid the added costs of extra shipments from Europe to China. At the same time, FlexLink set up an assembly workshop in Shanghai. The director of the supply chain group said that that was the right time for this major expansion in China:

> *"...with only one item it didn't make sense, because then you would have to buy one tool, and produce only one variant. Since you have tool-bound production, it was quite a big threshold; it was a package design, and it was a new product!"*

Avoiding the purchase of new tools in Europe made it easier for FlexLink to make this move. One reason for this decision was the possibility of making this large investment in purchasing new tools in China, rather than Europe, in order to take advantage of lower prices of the tools. "I mean we need to buy new tools, so let's do it all in China," the director of the supply chain group argued. His opinion was that it was easier for FlexLink to enter China with new products than to move the production of existing products from Europe, since the investment in tools for the existing products in Europe would have had to be paid off before any profit could be realized from the difference between the cost of finished goods in China and Europe, a process that might take as long as five years.

> *"So, in this case it was more like starting from scratch; the design was made based on the fact that the customers wanted it, and then we did everything in China, including the production of the components and the assembly."*

This approach also applies to other existing products for which the production tools at the European suppliers were worn out. When a tool that is being used to produce an item in Europe is worn out and needs to be replaced, it requires FlexLink's reinvestment in the tool. In some cases, FlexLink had the opportunity to consider ordering a new model of that tool from a supplier in China, instead of replacing the tool through the supplier in Europe – in cases where FlexLink considered it possible to move the item that is to be manufactured using the tool to China, and the supplier that is to manufacture the product in China is judged capable of doing so. The supplier's machinery (on which the tool would be assembled and used), capabilities for, and interest in starting up the manufacturing of the item are other important decision factors.

Besides the aforementioned reasons, DC1's good performance in 2004 made FlexLink more confident in expanding its business with DC1 to include another simple product – the connecting strips, which were added in 2005. Over time, the FlexLink–DC1 relationship kept increasing in business volumes and variety. This was accomplished by DC1 getting involved in all of FlexLink's annual new product development projects, so that each project would include a set of new products to be manufactured by DC1. By 2009, FlexLink's relationship with DC1 had become one of the company's most important supplier relationships in terms of volumes and scope of products.

Expanding the die-casting business with DC1 came at the cost of reducing business volumes with DC3 and DC4. Before starting with DC1, DC4 was responsible for almost 50% of FlexLink's total die-casting business volumes. By 2009, DC4's business with FlexLink had been reduced to only 20%, and DC4 realized that it could not survive as a manufacturer of high-volume simple items in Sweden. DC4 had lost a large share of its so-called "fast-movers[11]" due to the significant cost advantage derived from sourcing those items in China. Hence, DC4 became more flexible and widened its technological scope. With this technological expansion, DC4 managed to retain the low-volume but more complex products, while losing the high-volume, simple items to Chinese suppliers.

That die-casting expansion was followed by projects involving stamped, machined, and injection-molded items, for which FlexLink needed to widen the scope of its supplier base in China. Since around 2005, IM1 had been one of FlexLink's Chinese suppliers for injection molding. Among FlexLink's products, the chains business has one of the largest annual volumes. Between 2005 and 2008, IM1 had shown interest in producing the chains for FlexLink, but FlexLink never agreed to make this change. Over time, IM1 established relationships with large customers in the automotive industry, and this changed IM1's directions and interests. In 2008, FlexLink experienced price increases and lack of collaboration from IM1's side. FlexLink's decision-makers interpreted this as IM1's lack of interest in continuing business with FlexLink. Eventually, FlexLink looked for an alternative plastic injection-molding supplier in China, and moved away its tools from IM1. As

[11] This term describes high-volume, simple products, which, compared to other products, were easier and more profitable to move to China for production.

FlexLink's director of the supply chain group described it, *"So, when we told them that we are going to take away the tools, it was no surprise to them."*

In 2008, a former employee of FlexLink's China Sourcing unit recommended IM3 as a potential alternative supplier. After a series of visits and negotiations, a relationship was established between FlexLink and IM3, which expanded over the years with multiple new plastic injection molded components. IM3 is located within a few hours' drive from FlexLink's office in Shanghai, making IM3 the least accessible supplier of FlexLink in China. Most of its customers have larger transaction volumes with IM3, while FlexLink is considered a small customer.

4.3.3 MACHINING AND STAMPING IN CHINA BY 2009

Among the new machining products, pins and shafts were two groups of high-volume items. One of FlexLink's major suppliers of pins was MS1. In 2005, and in parallel with its expansion initiative in China, FlexLink found that these two groups of products represented strong potential for cost reduction if sourced in China. At the same time, there was a Swedish supplier, MS4, with which FlexLink had limited[12] past working experience, and which was planning on starting production operations in China.

In 2005, FlexLink contacted MS4 regarding the possibility of ordering pins from it in China. At that time, MS4's activities in China were limited to a sales office. In 2006, when MS4 opened its factory in Shanghai, FlexLink China Sourcing and MS4 in Shanghai started collaborating on the development of pins. At the end of 2006, pins with electronically polished surface were approved by FlexLink Components, and early in 2007, MS4 started mass production of pins for FlexLink. MS4 is a Sweden-based company with eight factories in Sweden and one in Shanghai. The pins produced by MS4 are sent from China to its own warehouse in Sweden; IM2 and IM4 purchase the items from MS4 in Sweden, and assemble some of the products they manufacture for FlexLink.

This move to China had a major impact on FlexLink's relationship with MS1. Before this move, around 95% of business volumes in FlexLink's relationship with MS1 consisted of pins. However, after this considerable reduction of business volumes, that relationship became difficult to handle for both sides. From the viewpoint of MS1, this decision of FlexLink had downgraded their relationship to a large extent. From FlexLink's point of view, its relationship with MS1 was not worth maintaining, given the limited business volumes remaining. Therefore, FlexLink decided to start looking for possibilities to end that relationship and consolidate the supply of the remaining 5% with other suppliers' businesses.

Between 2004 and 2006, FlexLink had a relationship with MS8 in China to produce shafts, but MS8's facilities were located far from Shanghai. As the relationship with MS4 in China continued to expand, FlexLink realized that there were potential benefits in replacing MS8 with MS4. Among these benefits were that MS4's factory was much closer to the FlexLink warehouse in Shanghai (located in the Waigaoqiao industrial area) and that importing to Waigaoqiao is difficult. With this change, FlexLink China Sourcing was able to purchase the necessary shafts in Waigaoqiao, and save money there. So in 2006, MS4 began to produce shafts for FlexLink, which abandoned its other shafts supplier (MS8) in China.

[12] Only for a few items, having low business volumes.

Machining operations carried out in the MS4 factory in Shanghai include milling, turning, drilling, cutting, etc., as well as assembly. In 2009, MS4 produced nine different types of shafts and six types of pins for FlexLink. For these items, turning, drilling, milling, and cutting operations are carried out by MS4. All shafts are ordered by FlexLink Engineering in Malaysia, and sent to FlexLink's consolidation point in China, from which FlexLink China Sourcing handles the transportation to Malaysia. However, for the pins, FlexLink Components in Sweden orders them from MS4 in Sweden, and then MS4 orders the pins from its subsidiary in China. The transportation of the pins to Europe is MS4's responsibility.

At the beginning of the pins project, FlexLink China Sourcing assisted MS4 in developing the product, and acted as a facilitator between the FlexLink Components engineers (in Sweden) and MS4's production personnel in China. After receiving confirmation on the design from FlexLink Components, the daily interactions were shifted to the European side of this relationship; since 2009, FlexLink Components in Sweden regularly contacts MS4 in Sweden to order the pins.

In this period of time, FlexLink's relationship with MS4 involves both the Swedish and the Chinese MS4 companies. In this relationship, all strategic negotiations take place in Sweden (between staff at the FlexLink and MS4 headquarters), while all day-to-day business is managed by FlexLink China Sourcing and the MS4 Chinese subsidiary. However, the financial transactions in this relationship officially take place between FlexLink China Sourcing and MS4 in Shanghai. This is mainly because alloy prices are flexible in China, while in Sweden they are defined by the market. Therefore, it is less risky financially to make the monetary arrangements based on the raw material market prices in China.

Between 2005 and 2009, besides pins and shafts, FlexLink decided to move a variety of other machined and stamped products to China. MS2 was a Swedish supplier that before the move was responsible for a large share of these items (around 75% of its business volumes). In 2007, FlexLink replaced MS2 with a Chinese machining and stamping supplier called MS3. Removing such large business volumes from FlexLink's relationship with MS2 considerably lessened MS2's interest in continuing to work with FlexLink. Over time, FlexLink realized that MS2 did not prioritize FlexLink's orders and did not proactively contribute to resolving problems related to FlexLink's products; nor did MS2 provide FlexLink with its expertise when FlexLink's designers needed input for developing new products. Soon, the FlexLink–MS2 relationship came to an end.

In late 2006, a former employee of FlexLink (and also a former employee of ABB, one of MS3's main customers) suggested that FlexLink China Sourcing investigate the possibilities of using MS3 as a stamping supplier. Via the internet, FlexLink researched MS3's capabilities in stamping thick items. Thereafter, FlexLink engineers in its China Sourcing unit visited MS3, sent RFQs to the company, and received quotations back. As a result, MS3 began to manufacture connecting strips, protection plates, and washers for FlexLink. Since then, this relationship has continued to expand in terms of variety of parts: new models of connecting strips and adjusting blocks have been manufactured since 2008, and spacers were introduced in 2009.

At the beginning of the relationship, FlexLink employees paid frequent, biweekly visits to MS3. By 2009, these visits had become reduced to delivery checks (by the quality inspector of FlexLink China Sourcing) that take place on every delivery, and visits concerning production problem-

solving (by the quality inspector), and new product development (by the manager and support engineer of FlexLink China Sourcing). Quality inspections take place at MS3 after production is completed and before final packaging; these inspections include checking the dimensions, the physical characteristics, packaging, and quantities.

FlexLink is one of MS3's most important customers, contributing 14% of MS3's annual turnover and ranking second among MS3's customers; the top spot is held by another customer which accounts for almost 50% for MS3's turnover. Since that customer orders more items from MS3 and updates its designs more frequently than FlexLink, the MS3 factory general manager stated that there are more conflicts in its relationship with that customer than with FlexLink. To date, FlexLink has helped MS3 make various small improvements. FlexLink has provided basic technical training for MS3's staff regarding how to satisfy its quality requirements, and helped improve its tooling and production processes.

MS3 produces a range of steel and aluminum items for FlexLink. Its steel items for FlexLink include connecting strips, protection plates, steel-top plates, stainless-steel feet, adjusting blocks, adapter plates, and a number of small items, such as washers, inner fittings, and square nuts. MS3's aluminum products include spacers and connecting strips. This involves stamping, machining, assembly, and surface treatment for aluminum anodizing and steel nitro-carburizing, zinc-coating, and sandblasting.

With the exception of surface treatments, all production activities are performed in house by MS3. The products are then sent out for surface treatment. MS3 utilizes one supplier for each of the three surface-treatment technologies used to finish the FlexLink products. Owing to Chinese government policies, in order for a company to be able to perform surface treatment, it needs to obtain a certificate to ensure compliance with several different aspects, especially environmental considerations. The products are inspected twice – once before they are sent out for surface treatment, and again after they are returned.

Sandblasting takes place at the end of production, before zinc-coating. In the beginning of this relationship, sandblasting was also outsourced, but this meant long lead times for the FlexLink products because of the two-step external processing. In 2009, MS3 purchased a sandblasting machine to be able to perform this activity in house and reduce lead times for the FlexLink products.

In 2006, at the beginning of product development with MS3, MS3 found a nitrocarburizing sub-supplier (called ST1) for FlexLink's products on the internet. Nitro-carburizing is a technology that is widely used in the armaments industry, and not many suppliers offer this technology in China. ST1 has a lot of experience in the armaments industry, but started to work with other industries a couple of years ago in order to attract other types of customers and make better use of its assets.

FlexLink paid several visits to ST1, sending engineers from FlexLink China Sourcing and FlexLink Components (in Sweden) at the same time as it was establishing its relationship with MS3. FlexLink first had ST1 treat the surface of one model of steel-top plate prototype produced in Europe, and found the quality acceptable. Then FlexLink ordered sample items from MS3 and sent them to ST1 for nitro-carburizing (after which FlexLink Components in Sweden confirmed

the product quality), and began to source this product and three other models of top plates from MS3 and ST1. In the beginning, FlexLink and MS3 engineers paid several visits to ST1, but today only MS3 is involved with and purchases surface treatment services from ST1.

For the raw materials, MS3 uses two suppliers for aluminum and two suppliers for steel; dual suppliers for each raw material enables MS3 to deal with delivery uncertainties. This was explained by the general manager of MS3's Shanghai factory: *"... because sometimes one has a lead time that is too long and the other one can deliver faster."* MS3 obtains aluminum and steel from the same suppliers for its other customers. Some of the aluminum purchased is used only for producing the FlexLink connecting strips, while the same aluminum extruders supply aluminum bars to MS3 for its other customers' products. Ordering from aluminum extrusion suppliers entails providing detailed specifications regarding the shape and other characteristics of the raw material specific to the product to be made with them.

This procedure is less strict when it comes to steel. The steel MS3 purchases from its suppliers is often used for a number of its customers. For example, for FlexLink's steel-top plates, 1.5mm stainless-steel bars are used. These are also used for products for two other large-volume customers of MS3.

As described earlier, various products of FlexLink include components, each of which is manufactured by a supplier. In the sub-section below, an example of such a product is presented to show FlexLink's role in coordinating between those suppliers.

4.3.4 EXAMPLE: PRODUCING IDLER END MODEL 1 USING MULTIPLE CONNECTED RELATIONSHIPS

In many cases, FlexLink's suppliers purchase items produced by other suppliers of FlexLink to complement the products they produce for FlexLink. Because some of FlexLink's European suppliers are quite small companies, they are not able to source cheaply from China; it is too difficult for them to do it directly, and too costly if they use an agent. Therefore, FlexLink purchases the required items in China, ships them to its international distribution center in Germany, stocks them there, and delivers them to its European suppliers as needed. This adds efficiency to FlexLink's business as well, according to the director of the supply chain group, because FlexLink *"have well-established flows and containers leaving from China every second or third week,"* and therefore the company can *"easily"* accommodate its suppliers' demands with these flows.

For example, the idler end model 1 consists of almost the same components as the other models of idler ends; however, its size and capabilities differ from the others. As shown in Figure 4-6, each of these components is produced by one of FlexLink's suppliers, and assembled by one of them. Two of its Chinese suppliers are involved in the production of this product: DC1 in China die-casts the side plates and uses a sub-supplier to paint them, and MS3 produces the connecting strips out of stamped aluminum. These items are all sent to FlexLink's international distribution center in Germany, and sold from there to MS6 in Sweden. This supplier also purchases injection-molded guiderails from IM2 in Sweden and bearings from BR2 in Sweden. MS6 performs some final machining operations on the side plates and assembles all the items together with the shafts they produce.

Such supply arrangements imply that FlexLink considers itself both a customer and supplier to suppliers that perform assembly for FlexLink. As the director of FlexLink's supply chain group explained:

> *"Sometimes we are beating on them: You are not delivering, you are not delivering! But they sometimes tell us we cannot deliver because we don't get the components from you! So sometimes we are our suppliers' suppliers."*

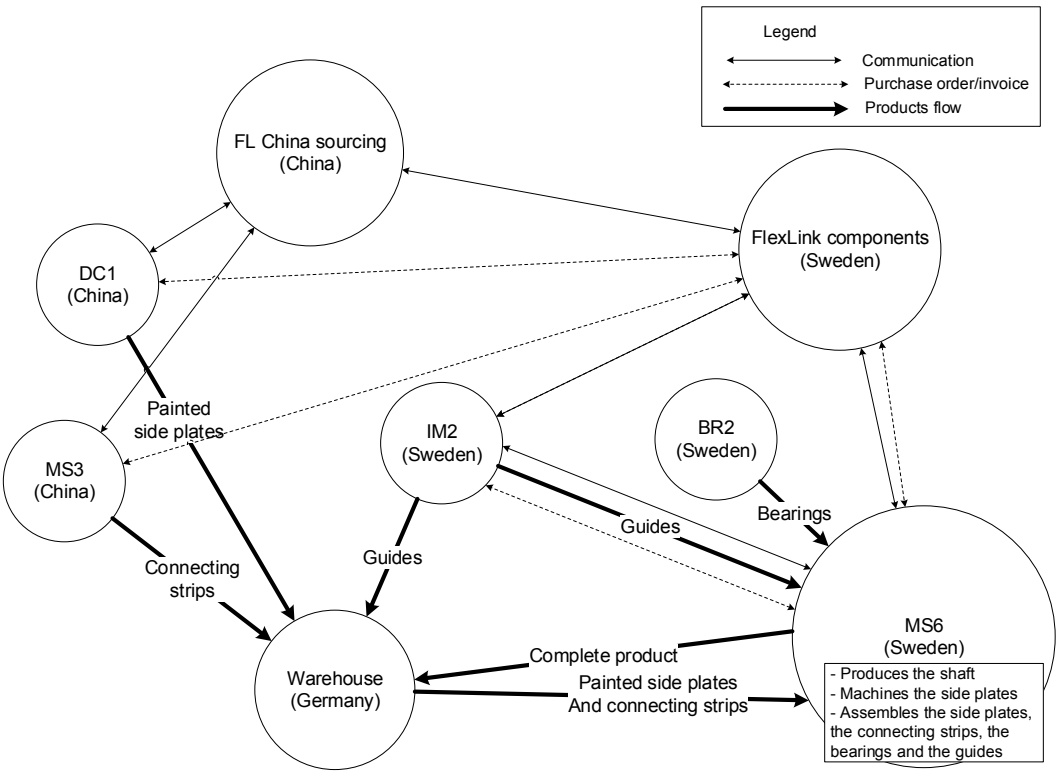


Figure 4-6: Supply network for idler end model 1

4.4 FLEXLINK'S SUPPLY NETWORK DEVELOPMENT BETWEEN 2009 AND 2013

In line with FlexLink's annual new product development projects, its supplier base has received purchase orders for several new products, while a number of those suppliers have made important contributions to FlexLink's new product development. In 2013, the suppliers that were considered the most important for FlexLink were IM2, MS6, AE4, MO1, SC1, IM4, and MS5.

A summary of the developments in FlexLink's supply network in the time period described in the case description is illustrated in Figure 4-7.

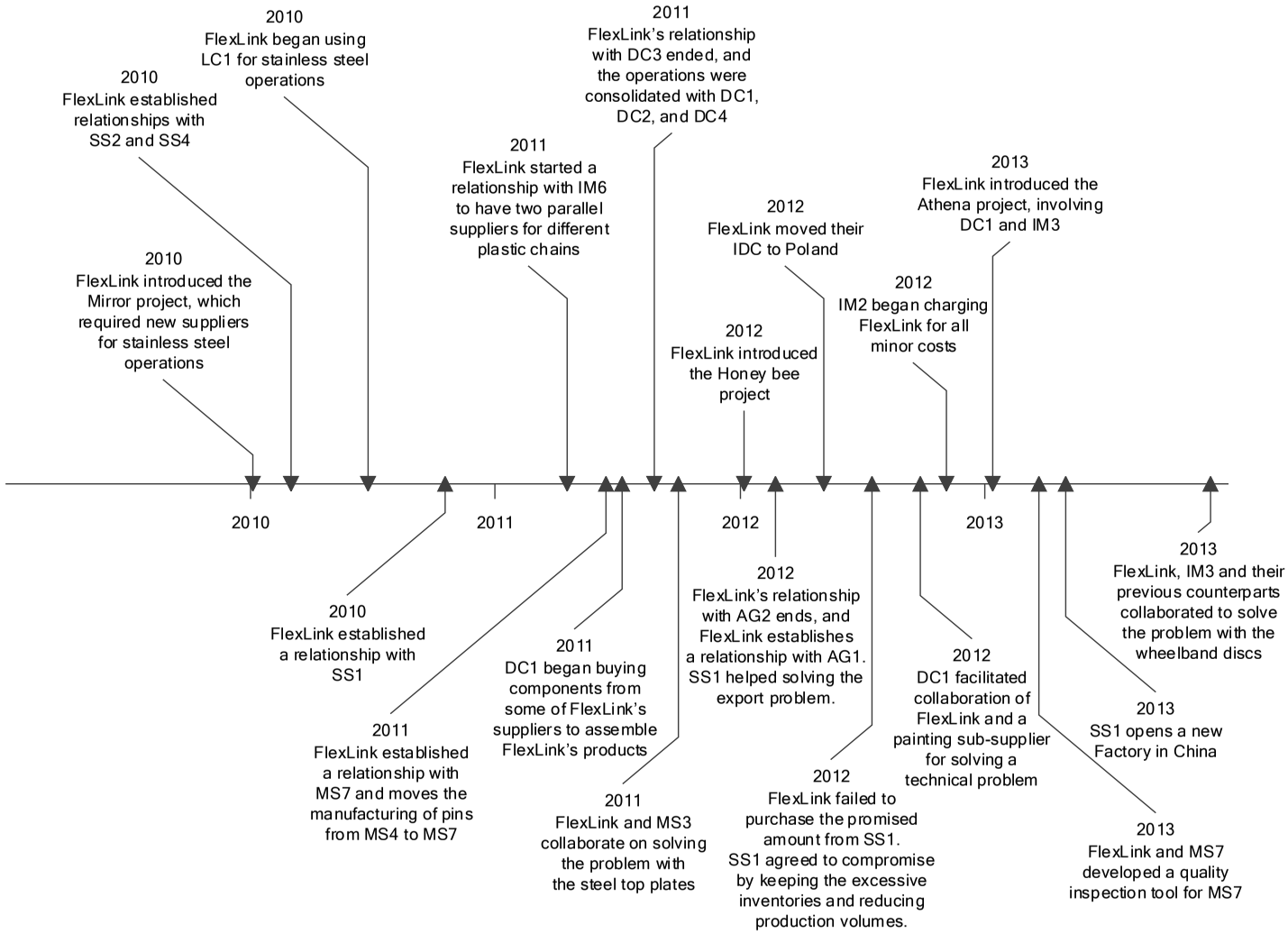


Figure 4-7: A summary of the developments occurring between 2009 and 2013

AE4 is the most important aluminum extrusion supplier for FlexLink. However, FlexLink's relationship with AE3 grew significantly between 2009 and 2013, and the business volumes exchanged in that relationship have reached almost one-third of FlexLink's business with AE4.

FlexLink also has a relationship with the plastic raw material suppliers (PR1 and PR2) that supply IM2 and IM4. Every once in a while, when PR1 and PR2 have new products (raw materials), they visit FlexLink and present those products. Usually, when problems related to FlexLink's products are associated with the raw materials, FlexLink brings up the problems with PR1 and PR2 to discuss the properties of different raw materials. FlexLink has direct contact with them, meaning that engineers in FlexLink have direct contact with engineers in PR1 and PR2. These discussions are both about the properties of the raw materials FlexLink suppliers use, and about alternative raw materials that FlexLink could use for its products. This is important for FlexLink because in most cases, FlexLink's product specifications indicate the types of raw materials that IM2 and IM4 should use during production.

As has been the case for all the years examined, IM2 is currently one of the most important suppliers for FlexLink. In 2013, business volumes between FlexLink and IM2 accounted for around 35% of IM2's total turnover, which was less than FlexLink's share of IM2's turnover in 2009. However, over the years FlexLink and IM2 have remained close to each other in their relationship and have maintained large volumes of business with each other. FlexLink and IM2 continually have discussions on possibilities for reducing costs. One of FlexLink's product quality engineers described this relationship this way:

> *"The relationship is very tight. We work together every day, whether it's for quality, logistics, projects (for example, technical solutions, project plans), tools (for example, tool issues, new tools, quotations for new tools), or purchasing (for example, price negotiations)."*

Every now and then FlexLink introduces various new products to this relationship, and requests the help of IM2 in solving problems of different kinds. Almost every two weeks, FlexLink quality engineers meet with IM2's engineers to discuss the development of new products as parts of FlexLink's projects. In recent years, FlexLink and IM2 have increased their collaboration, and FlexLink considers this important for the relationship, as described by one of FlexLink's product quality engineers:

> *"It could be more [important]! Sometimes we are sitting here and don't know what is happening there with the tools and production, and they are sitting there and don't know what is happening with the projects and designs. So, over the last couple of years, we have tried to increase the number of meetings. […] You need to have a push in the process. It is very difficult if you do not talk every week or so. So, this is very important."*

For such complicated products as chains, this communication is vital. The mold used for manufacturing them is complicated and a lot of problems arise continually that have to be resolved through communication between FlexLink and IM2 or IM4. This is one of the reasons FlexLink has not been able to source the chains in China, despite the fact that FlexLink's senior management is interested in expanding sourcing in China, especially with such high-volume products that seem to be an apt opportunity for major reduction of production costs. Communication between

FlexLink and the Chinese suppliers is not as frequent and smooth as it is with IM2, IM4, or a handful of FlexLink's other European suppliers; this makes it difficult to move such complicated and collaboration-dependent products from European to Chinese suppliers.

For instance, in 2013 one of FlexLink's designers was trying to optimize the design of a plastic steering guide (one of IM2's products), and built a prototype product using a 3D printer at FlexLink. The prototype passed different checks, and therefore FlexLink decided to order the modified product from IM2. However, just after producing the first samples, IM2 realized that the design was problematic, and as a result, the products ended up out of tolerance during production. This problem was such that it could not have been foreseen before the initial samples were manufactured in actual production settings. Although this was a problem with FlexLink's design, IM2 came back to FlexLink with feedback and some ideas, and over a couple of months, they kept working together to solve the problem.

From 2009 to 2013, FlexLink's relationship with IM2 also underwent another significant change. By 2013, IM2 had begun charging FlexLink for every small detailed expenditure they incurred in relation to FlexLink's products, including even the routine cleaning and regular maintenance of the tools. This situation was different in the past; IM2 used to cover the smaller costs and charge FlexLink only for major costs.

One of the major changes on the supply side of FlexLink before 2013 was moving its international distribution center (IDC) from Germany to Poland. In the past, FlexLink contracted warehousing and distribution services from a third party that owned a distribution center in Hamburg, Germany. In Europe, all of FlexLink's products were sent to this IDC and distributed from there. In 2012, FlexLink decided to open an IDC in Poland. This was done primarily to obtain the significant cost advantage of operating its own IDC in Poland, rather than having the job outsourced to Germany. The Poznan area, where the IDC is located, is not the least expensive location in Poland, but in general the costs are still much lower than in Germany or Sweden. Today, a major share of those cost advantage estimates have been realized.

In addition, the need for increased flexibility was an important driver for this change. When interviewed, FlexLink's director of the supply chain group said that having to run its own IDC has perhaps not been *"easier"* than when it was outsourced, but it is more flexible. One of the biggest challenges facing distribution is handling the workload peaks, and by having an IDC in Poland, FlexLink has more options when scheduling working hours and can better distribute the workload.

FlexLink's new product development project for 2013, the Athena project, was launched in January of that year. It involved a new set of products that replaces an older complete platform of products; Athena includes new versions of side plates, wheel bands, connecting brackets, some plastic components, aluminum extruded profiles, and more. The design of most of these products was performed at FlexLink in Sweden, then the purchasers assigned to Athena broke down the whole project in terms of coordination and logistics considerations. For most of the newly developed items, FlexLink asked the same suppliers as before to produce them.

When it comes to China sourcing, FlexLink's supply network in 2013 has become quite different from the past. In 2013, the introduction of the Athena project increased the business volumes in FlexLink's relationships with DC1 and IM3, because the project includes many items that are very

similar to products those two suppliers already manufacture for FlexLink. Since these products are newly introduced, the demand for them is volatile, and this has put DC1 and IM3, among other FlexLink suppliers, under high pressure for delivering low-volume and highly variant purchase orders. Air transport was therefore frequently used by DC1 and IM3 in 2013. One of the reasons for high involvement of some of the Chinese suppliers in the developments related to the Athena project is that plans call for a large share of the items related to this project to be used by FlexLink's Malaysian assembly unit. Hence, geographical closeness of the Chinese suppliers to FlexLink's Malaysian unit has played an important role in this decision.

In the sub-sections below, a variety of important developments in FlexLink's supply network are described, and these are complemented by some important aspects of that supply network.

4.4.1 SOURCING TO SUPPLIERS BASED ON THEIR CAPABILITIES

Currently, none of FlexLink's items is subject to a dual-sourcing approach. FlexLink's approach in its supplier base has been to have multiple suppliers for each technology required, in order to be able to deal with unexpected uncertainties, but not to order the same products from multiple suppliers. With a single-sourcing approach (and knowing only that switching suppliers within the supplier base is technologically possible), FlexLink manages to reduce its costs in terms of tool investments.

Under a dual-sourcing approach, if a problem should occur for either supplier, the FlexLink tools can be moved from one supplier to the other and manufacturing can continue. However, it is not easy to start production of an item at a supplier for the first time, using existing tools previously used by another supplier. The tools need to be adjusted to the new suppliers' machinery, which normally takes two to three weeks. Therefore, applying this idea in reality is complicated. FlexLink's director of the supply chain group described these difficulties thusly:

> *"It's not a piece of cake; but it's possible. […] it's always difficult to start something up. [For instance, for the injection-molding industry] if you have constructed a tool yourself, it fits your production process. Or [for instance, with the die-casting technology] die-casting machines are not identical. They are different brands, and they are different [in various aspects]."*

FlexLink sees this approach as useful, because it allows FlexLink to have only one supplier responsible for each product category. However, the establishment of a relationship with IM6 is one the few exceptions to this rule. FlexLink's relationships with IM2 and IM4 have been both close and high-volume over the years. Although both of those suppliers are plastic injection molders, the categories of products they produce do not overlap. IM2 manufactures wider varieties of more highly customized products for FlexLink, while IM4 manufactures high-volume products that are essential to FlexLink's offerings or, as described by one of FlexLink's quality engineers during an interview, *"bread and butter"* items. In 2011, when processing its annual product development project, FlexLink decided to seek a new supplier to provide a portion of these supplies, and found IM6 for this purpose. This decision was made because the availability of this group of items was important to FlexLink, and the company felt the need to have another supplier. Besides, FlexLink's cost-cutting initiative supported working with this Hungarian supplier (IM6) that could deliver the products for a much lower cost than IM4.

This technology-based, multiple sourcing approach has also allowed FlexLink to have multiple options available during certain developments in its supplier relationships, such as consolidating particular operations between specific suppliers whenever a relationship with a supplier is ending. However, ending a relationship in FlexLink's supply network has proved very challenging. This approach plays a particularly important role in developments in FlexLink's supply network because it affects developments in multiple relationships in relation to each other. FlexLink's corporate development specialist described the importance of this approach:

> *"During the transition from one supplier to the other, there is a lot of dirty laundry coming out of the closet. Of course, the supplier is disappointed. They are all always professional; I have not seen any unprofessionalism. But for natural reasons, instead of focusing on how we can develop and become more efficient and thereby reduce the prices, the discussions shift focus to the supplier trying to find a way to recover from the costs they have spent for FlexLink. Sometimes they come and say that we have, for example, 'three months of supplies and you have to buy them!' When we ask why you did this without any purchase orders from us, they reply that 'Well, you had told us that the volume will be this and that in the upcoming year.' [...] In general, we try to be fair in such situations, because if the products are good sellable products, it is a shame to let them go to waste. We would then ask for the same price as we get from the new suppliers, but then the new supplier will be disappointed, because we would have to wait another two to three months before we can start buying from them. So, we try to work out a deal.*

For example, FlexLink used to have three die-casting suppliers in Sweden (DC2, DC3, and DC4), each of which used to produce a couple of groups of die-cast items. After DC1 joined the FlexLink supplier base, the total count of suppliers capable of such production was four. Over time, FlexLink gradually moved more of the items produced by the European die-casters to DC1. In 2011, FlexLink realized that the Swedish die-casters were only responsible for a limited share of total volumes for die-cast items. More specifically, all of FlexLink's dealings with DC3 were down to only 10 parts, so the company decided to abandon this supplier relationship and transfer its tasks to the three other suppliers in the supplier base. As a result, DC1 was asked to produce four of these items, and the remaining six were consolidated with the other two suppliers; aluminum die-cast items went to DC4, and zinc die-cast items went to DC2. However, DC3 received one last large order (for about four months' worth of supplies) before being phased out. Afterwards, the tools were shipped from DC3 to the other suppliers. On the one hand, this decision to move the tools was problematic, because it meant that production of the given items at the other suppliers could not have started before the relationship with DC3 ended. On the other hand, this was a sound decision because ending relationships involving tool-dependent manufacturing has always been challenging for FlexLink when it comes to deciding what to do with the tools, since the tools are expensive and the supplier that is being abandoned does not need them anymore.

By 2011, FlexLink's business with DC4 was reduced by 85%. However, a few years before that, DC4 had made some strategic changes and widened its technological scope, so that the company could manufacture more sophisticated items. This was among the reasons that, in 2011, FlexLink

chose to retain DC4 over the DC3 relationship. This resulted in an increase of the business volumes for DC4 to around 30% of FlexLink's total die-cast business volumes in 2011.

4.4.2 A TECHNOLOGICAL EXPANSION: STAINLESS STEEL DIE-CASTING

FlexLink's 2010 new product development project (the Mirror project) focused on a new category of products: stainless steel. The products developed in this project were stainless- steel versions of a majority of older products, with technology-specific changes in design.

Before this project, FlexLink had received some offers for stainless-steel products. To deal with that demand, FlexLink had found new suppliers and tried to cover all of that demand by reselling products designed and manufactured by those suppliers. However, for the Mirror project, FlexLink decided to provide a wider range of stainless-steel products. This meant designing a new platform and required the involvement of a wider range of suppliers that would produce FlexLink's designs. None of the existing suppliers of FlexLink, whose stainless-steel products were being resold by FlexLink, were capable of producing any of the newly designed products of the Mirror project. As a result, FlexLink initiated a search and added SS1, SS2, and SS4 to its supplier base between 2010 and 2011.

Besides finding new suppliers, FlexLink decided to use a number of its existing suppliers of regular steel products for the production of the newly developed stainless-steel products. Two of those suppliers were SS3 and LC1. As described above, FlexLink used to purchase certain sets of products designed by SS3 and featured in its catalogue. For the Mirror project, FlexLink selected new products from SS3's catalogue to match the designs of the Mirror project products.

Moreover, for a long time, FlexLink had had a relationship with LC1, a Swedish machining and laser-cutting supplier. In the past, FlexLink's relationship with LC1 was focused primarily on bending and laser-cutting of regular steel. For some of the newly developed products of the Mirror project, FlexLink expanded its relationship with LC1 to also include laser-cut stainless-steel products. LC1 sends some of the finished products to MS6 for assembly into FlexLink's drive units (not stainless steel), and delivers others directly to FlexLink.

A group of newly developed products comprised different models of beams and profiles. Before the Mirror project, FlexLink had a supplier for profiles and beams, but the stainless- steel beams developed for the Mirror project required a specific technology that none of the existing suppliers of FlexLink could offer. Therefore, FlexLink had to find a new supplier for stainless steel beams, called SS4, while maintaining the relationship with the other steel beam supplier to provide the spare parts for the older system. SS4 is located in Austria, and specializes in the production of larger items using its outsized production machinery.

Drive units are among the most important components of systems that FlexLink sells to its customers. As a part of the Mirror project, FlexLink designed stainless-steel versions of drive units, and found SS2, very experienced in this field, to manufacture them. SS2 also sells drive units to other major customers besides FlexLink. However, the drive units they manufacture for FlexLink are FlexLink-unique. In order to deliver complete stainless-steel drive units, SS2 purchases certain plastic parts from IM2 and assembles them into the drive units. FlexLink can directly sell the complete stainless-steel drive units, without a need to perform any pre-sales assembly. The parts that SS2 purchases from IM2 are also FlexLink-unique.

In addition to the above-mentioned suppliers, the Mirror project included a variety of small stainless-steel components, such as guiderail bracket components. FlexLink engineers decided to use die-casting for producing them. However, stainless steel die-casting is a labor- and energy-intensive job, and given its experience with China sourcing, FlexLink's Product and Supply division was eager to conduct this activity in China. Besides, this was in line with FlexLink's interest in expanding its China sourcing. So late in 2010, FlexLink Sweden sent the drawings and manufacturing process specifications to its China Sourcing unit, and asked the unit to find a suitable supplier to manufacture the products. FlexLink's director of the supply chain group also specified to the Chinese team that the supplier selected should preferably have some export experience. The China Sourcing unit of FlexLink made a search on the internet and found some 50 suppliers with this technology in China. The manager of the China Sourcing unit visited four of them and checked their capabilities. During these visits, by checking sample products for its other customers, it became clear that SS1 possessed the required capabilities.

Afterwards, the RFQ and quotations procedure was followed for these suppliers, and two suppliers were initially selected. SS1 was ranked first, because of its low prices, but it was small and had an old-fashioned, dark, and not very clean factory, while the other supplier was cleaner and more modern, but with significantly higher prices, and was also located farther away than SS1 (in Jiangsu province). SS1 was not completely inexperienced in exports, but since it did not have an export license, it used an agent to take care of its exports.

At this point, FlexLink's director of the supply chain group, product quality manager, and the project manager for this specific product jointly selected SS1. The director of the supply chain group explained it this way:

> *"... so together we said, 'Let's go for SS1. We know it's slightly higher risk, we know that we most probably need to invest more time in training them and communicating with them and making sure we have a strong presence, and being there when they produce, making sure that we get the quality we want. But it's worth it, because the price difference is so significant.'"*

The decision to choose SS1 was made centrally in Gothenburg, with the agreement of the manager of the FlexLink China Sourcing unit. The importance of price differences for FlexLink was enhanced by the significant price challenge it was facing for this new product line. Besides the labor-cost advantage, to reduce the energy costs SS1 performs these tasks partly at nights when energy prices are lower. When interviewed, the director of the supply chain group stressed the importance of this cost advantage:

> *"It was the cost reduction project, we were reducing some products and replacing them with some new ones, and the challenge was to significantly lower the costs, because they were not selling, since they were too expensive."*

FlexLink started SS1 off with an urgent order, and SS1 successfully fulfilled the quantities on time with more or less satisfactory quality. This project took around nine months to develop before the first items could be produced by SS1. When interviewed, FlexLink's director of the supply chain group said he believed that although the quality still needed minor improvements, input from the

manager of the China Sourcing unit indicated that the supplier had a positive attitude, listened to FlexLink's feedback, and was willing to improve, and these factors were all important in deciding to maintain the relationship with SS1:

> *"And that I think is the most important thing when you feel that you have their attention, and some flexibility, and there is a willingness to improve. ... at least we are on this okay level, and we can improve step by step from there. It would have been different if we were not happy at all, and then we would have needed to do a lot of work just to get up to the okay level. […] We don't have a Swedish stainless-steel die-casting supplier, since this is a new item […]. We would rather have two Chinese ones [instead of adding a European supplier with the same technology], because it is so much cheaper."*

The surface quality of the products of such a process is usually lower than that of machined products, but this process is an inexpensive way of making complicated shapes using stainless steel. Machining such complicated items is much more costly and difficult. At the same time, for this type of product the surface quality is not important to the customers, as the products are not used in a way that is visible; therefore, paying for better surface quality is unnecessarily expensive. All of FlexLink's stainless-steel die-cast items have the same functionality as the other similar FlexLink items that are die-cast, except for the raw materials and their characteristics. For instance, stainless-steel die-cast items are more rigid and hygienic; since the whole platform is made from stainless steel, it is suitable for use in the food or pharmaceutical industries.

The designs of the stainless die-cast items are also different from their die-cast counterparts. For instance, aluminum die-cast spacers are cylindrical, while stainless-steel spacers are threaded. Stainless-steel side plates are much thinner than aluminum die-cast ones, owing to the difference in the strengths of the materials. Because these side plates are thinner, die-casting is the best way to overcome the complications in the geometries of the design. This also entails differences in the designs of all related items.

Between 2011 and 2013, this FlexLink–SS1 relationship developed much further. Directly after the launch of the new product family, there was a boost in FlexLink's stainless-steel sales. That resulted in a major expansion of business between FlexLink and SS1, totaling almost 2 million SEK business volumes between the two companies. However, in 2012, as a result of FlexLink's introduction of other new product families and erroneous inventory planning at FlexLink (which resulted in excess inventories of those items at FlexLink's IDC), the business volumes in this relationship decreased to around 500,000 SEK. By resolving the problematic inventory policies for the stainless-steel die-cast products, this relationship experienced higher business volumes in 2013. In 2012 and 2013, FlexLink and SS1 developed a number of new products together, such as a new group of guiderail brackets as a part of the Honeybee project.

In 2011, new Shanghai governmental energy and pollution policies caused many factories to relocate from Shanghai. Therefore, in November 2011, SS1 moved its factory from Shanghai to Zhejiang province. This move only took two weeks: one week to move the machines and one week to start up the machines and the production. To conduct this move, SS1 asked all of its customers to stop issuing purchase orders for a month, but this did not affect FlexLink, because the move

occurred in a period when FlexLink did not issue any purchase orders. After opening the new factory, SS1 invested in purchasing new machines and gaining new capabilities. In 2013, SS1 had two factories: one for precision casting of stainless-steel components, and another one for post-casting processes. The latter factory offers three CNC machines, four laser machines, and one CMM machine for inspection.

Between 2011 and 2013, FlexLink's cooperation with SS1 improved greatly. From the viewpoint of FlexLink, SS1 has become faster and capable of executing a larger variety of tasks than before. SS1's new capabilities (the post-casting processes) are valued by FlexLink, because before 2013, SS1 outsourced those processes, which entailed additional costs and allowed less flexibility. Furthermore, between 2011 and 2013, SS1 expanded its customer base and managed to find multiple large customers in the pharmaceutical industry. According to FlexLink's China Sourcing unit manager, comparing 2013 to 2011, the production process at SS1 had become much more efficient, and the time it takes to develop a new product together with SS1 has been shortened. That is mainly because SS1 has become more experienced by working with a wider range of customers, and because of better understanding that has developed on both sides of the FlexLink–SS1 relationship.

Over time, in many situations FlexLink has received help from or provided support to SS1. For example, in April 2013, SS1 delivered a set of initial samples of a product under development to FlexLink Sweden. FlexLink Sweden worked on the sample and sent its feedback to SS1. To make it possible for SS1 to meet the quality requirements demanded by FlexLink, FlexLink's China Sourcing unit helped SS1 to improve its gate processes during the CNC machining operations. By repositioning the gates based on the ideas received from FlexLink's design engineers in Sweden, SS1 managed to prevent some quality issues related to the FlexLink products manufactured at SS1. FlexLink's director of the supply chain group emphasized the importance of FlexLink's reliance on SS1's capabilities:

> *"I'm not sure [if we have taught them that much]. We were new to this process, too. We relied on the feeling that they would be able to make this happen for us. But also we had to trust that they are able to handle it."*

4.4.3 A NEW SUPPLIER FOR ASSEMBLY GUNS

Before 2012, FlexLink had a Swedish supplier (AG2) for producing a tool (designed by FlexLink) for both pulling and pushing pins during the assembly process; in other words, an assembly gun used during the manual chain assembly for removing the pins and putting them back again. In 2012, FlexLink decided to cut costs on this item, and so one of FlexLink's strategic purchasers and its manager of the China Sourcing unit initiated the process of finding a supplier for this item in China, and found AG1 for this purpose. FlexLink Sweden sent the drawings to the supplier and received the initial samples, then gave feedback and had the samples remade a couple of times until FlexLink was satisfied with the quality and price level.

During this process, there were some initial production issues that were solved by the feedback that FlexLink gave. The feedback concerned primarily the material, the surface structure, and issues about greasing the gun. Regarding the material, when this item was produced in Sweden, steel rods were used, but when AG1 produced them with steel rods, FlexLink realized that the strength was lower than before. FlexLink had issued quality requirements for the product,

primarily specifying how many shots the gun should hold, but the initial samples delivered by AG1 did not meet the specification for the number of shots. FlexLink suggested the use of stainless-steel rods, and this would still be possible with a suitable price. When interviewed, one of FlexLink's purchasers of strategic products involved in this relationship remarked, *"We didn't tell them how to produce it; we just said we would like the rod structures to look like this."*

In 2013, the first shipment for the largest-volume model of the assembly guns left China. For the other models of the guns, FlexLink kept updating the drawings in 2013 to have them produced by AG1. AG1 is a small supplier located a 3.5-hour driving distance from Shanghai. FlexLink's purchases constitute only around 0.5% of AG1's turnover. AG1's small size and lack of significant experience cooperating with western customers created a problem for its relationship with FlexLink. AG1 does not have an export license, and used to sell its products to a trading company for export to Europe. However, FlexLink preferred to avoid unnecessary middlemen, and make the products available in Europe with as little markup as possible using its available resources. To solve this problem, FlexLink involved MS3 and SS1 in the negotiations with AG1 on this issue. The group reached a consensus that SS1 would buy the items for the same price from AG1, then sell them to FlexLink with a 5% margin to cover the transportation from AG1 to Shanghai, and for the management and handling costs of SS1. Then SS1 would consolidate the transportation of these items with its own deliveries to FlexLink's IDC in Europe. This arrangement also contributed to SS1's resolution of its transport utilization problem, since SS1 does not have frequent shipments to FlexLink's IDC in Europe.

4.4.4 A NEW SUPPLIER FOR THE HIGH-VOLUME PINS

As described above, pins are among the items with the highest business volumes among FlexLink's products, and since 2007, MS4 had been responsible for producing them in China. According to FlexLink's contract with MS4, MS4 was responsible for manufacturing the pins. However, MS4 changed its decisions early on and did not invest in new machinery to produce the pins, instead finding a supplier in China to do this. MS4 never communicated this change completely to FlexLink, telling FlexLink only that the pins were partly outsourced. Since this deal was made in Sweden between FlexLink and MS4, and FlexLink's China Sourcing unit was not responsible for the pins business, it was difficult for FlexLink to learn of this problem.

Moreover, FlexLink had a deal with MS4 on currency compensation, under which FlexLink would compensate MS4 for every purchase order where it lost money due to currency-rate fluctuations. However, some eight to 10 months after the currency compensation was required to be reported, MS4 requested FlexLink to compensate for its currency loss in the previous year. Long before this, FlexLink had closed all financial books, and it was difficult for FlexLink to deliver this compensation. Besides, from the viewpoint of FlexLink, it was MS4's responsibility to report any currency losses in a timely manner. This problem was also a result of MS4 outsourcing FlexLink's pins, without involving FlexLink in the deal. In MS4's relationship with the pins supplier, the pins supplier had increased the price and MS4 had not been able to renegotiate it. Therefore, at that time MS4 was trying to get some compensation on the pins from FlexLink, using the late currency loss report as an excuse. At that point, MS4 threatened FlexLink with stopping its production of pins unless FlexLink would agree to the compensation and a price increase. This became another reason for FlexLink to reconsider staying in a relationship with MS4. FlexLink's corporate

development specialist described this approach of MS4 as *"a red card […] especially if you have a contract."*

The pins are critical items for FlexLink, since they are a very high-volume item, and are used in all FlexLink systems. Therefore, FlexLink could not risk an interruption in its production flow. In addition, FlexLink had its European pins supplier disassemble its manufacturing facility a long time ago, and hence it was almost impossible to use that supplier for pins again. FlexLink offered a deal to MS4 to increase its prices 10% and keep sourcing from MS4 until FlexLink could locate a new supplier. MS4 agreed to the terms and promised to provide good support for transition to the new supplier. Meanwhile, in 2011, FlexLink's China Sourcing unit became responsible for finding a new supplier for pins in China. After a search on the internet, they found MS7. FlexLink's manager of China sourcing paid a visit to MS7, and made a positive report to FlexLink Sweden. In May 2011, the first meeting convened between FlexLink's director of the supply chain group and MS7's management team. Then, FlexLink's product quality manager, one product quality engineer, one strategic purchaser, and the China sourcing manager paid several visits to MS7 to ensure that MS7 had the proper processes and capabilities to manufacture the pins for FlexLink.

Around November 2011, an RFQ and initial samples were exchanged between MS7 and FlexLink. This took almost a year, and included sending two initial samples to FlexLink's product quality group in Sweden, and multiple tests being run on the raw materials in a lab in Shanghai by FlexLink's manager of the China Sourcing unit. In November 2012, FlexLink issued the first purchase orders to MS7, and in 2013, FlexLink issued two more purchase orders. MS4 provided various types of support during this transition, as promised. For instance, MS4 helped by selling its excess raw materials to MS7, and made it possible for MS7 to run tests with the exact same raw materials used before.

With this major change, FlexLink purchased all of the pins from MS7 and the pins were delivered to its IDC in Europe. Then, IM2 and IM4 purchased the pins from FlexLink, on demand. In 2013, during the transition period from MS4 to MS7, IM4 kept buying the stocked pins from MS4 until stock ran out. Afterwards, IM4 joined IM2 in purchasing the pins from FlexLink. Apart from that, FlexLink's business with MS4 was limited to shafts, which are mainly used by FlexLink's assembly unit in Malaysia.

The quality of the MS7-produced pins, compared to the pins that MS4 used to produce for FlexLink, is neither better nor worse. MS7's pins have vibration polish for surface treatment, while MS4's pins had electronic polish. However, FlexLink does not get involved in such details – rather, the company demands only a certain roughness, and MS7 can deliver it.

The cost of buying these products from MS7 is much lower than FlexLink's previous deal with MS4. However, since IM2 and IM4 are now buying the pins from FlexLink, FlexLink now has greater responsibilities with regard to this item. For instance, if emergency deliveries (air freight) are required, it is FlexLink's responsibility to ensure that IM2 and IM4 obtain its required supplies on time. The transportation setup is similar to the one in place when MS4 was responsible for the items. FlexLink consolidates the pins shipments with its other shipments, and hence avoids the cost of extra containers. Although lead times have not changed, FlexLink's director of the supply chain group is highly satisfied by the results of this change, mainly due to having removed a

middleman (MS4) and being able to work more closely with the supplier (MS7). FlexLink's relationship with MS4 is now limited to the shafts business.

MS7's machinery is shared between FlexLink and MS7's other customers. FlexLink sends POs sporadically, so MS7 uses its machinery for its other customers in between FlexLink orders. However, there are some negotiations underway with MS7 to open a new factory primarily for FlexLink's products. This is motivated by the high volumes of FlexLink's purchase orders for pins.

MS7 buys the raw materials from a supplier in Taiwan (which buys the raw materials from a supplier in Japan). MS7 is responsible for this part of the business, and FlexLink is merely aware of it. MS7 has been in a relationship with this Taiwanese raw material supplier for more than 15 years, but the raw materials MS7 buys for FlexLink are unique in its dealings with that supplier. MS7 performs regular tests on the raw materials, and FlexLink's China sourcing manager visits MS7 often to run some tests and assist MS7 if it encounters any problems. The tests include cutting out two pieces from the received batch of raw materials and sending them to STS (an official laboratory in Shanghai), where a certificate will be issued providing information about the characteristics of the material. FlexLink demands only random checks on the items from MS7. These tests ran a couple of times during the start of the project, but since the start of mass production, FlexLink has run these tests only once. This is because it is too expensive to do this test, and besides, the raw material supplier in Taiwan performs the test every time and sends a report to MS7. FlexLink checks those reports every time they have a batch production. Still, FlexLink retains the option to take random samples from the raw materials and send them to STS for testing.

In 2013, FlexLink asked MS7 to find a supplier to produce optical inspection equipment, used to ensure the quality of the pins and their different characteristics. FlexLink specified the dimensions and characteristics it wanted the equipment to measure. MS7 found a supplier in Taiwan and ordered the equipment. FlexLink did not directly invest in purchasing the equipment for MS7, but instead promised to compensate the costs by paying additional margins on the products MS7 manufactures for FlexLink. The agreement was that FlexLink would guarantee the purchase of some 10 million pieces from MS7, while MS7 agreed to make the investment and buy this equipment, while slightly adding to the price of the pins until the investment is paid off. In addition, MS7 was allowed to use the machine for other customers.

4.4.5 DC1 BECOMES AN IMPORTANT SUPPLIER

Another important change in FlexLink's sourcing business in China is that DC1 has gained a more important role in FlexLink's supplier base. As mentioned above, FlexLink has not only moved the production of some existing products to its suppliers in China, but also in many cases of new product development, FlexLink phases in new products with the help of its suppliers in China. In the past, this process was a one-way street in FlexLink's relationships in China; FlexLink would send the orders, and the Chinese suppliers would produce, albeit with problems. However, this situation has changed over time. By 2013, there were many cases in which DC1 had contributed to solving problems related to FlexLink's products. When developing new products, FlexLink first sends the drawings to DC1. Then, DC1 normally gives feedback to FlexLink regarding its designs, and FlexLink, using DC1's feedback, redesigns the product. This process may be repeated a

number of times before DC1 is able to start the mass production of FlexLink's orders on new products. The manager of FlexLink's China Sourcing unit finds this an opportunity:

> *"Many times they come back to us and help us if we had missed something in the drawing or if there is a misunderstanding. They give us good suggestions for our products because they know our products and their functionalities."*

In some cases, this assistance is provided proactively by DC1. For example, when FlexLink introduced a new product family, DC1, the supplier of the guiderail brackets for the previous family, was also assigned to produce the guiderails for this new family. The new rails were shorter than the previous ones, and DC1 realized that it could use the old items (longer rails) and machine them to achieve the new (shorter) ones. In all other respects, the designs of the two products were completely identical. Therefore, DC1 responded to FlexLink with this feedback, and FlexLink redesigned the rails in a way that enabled DC1 to produce them by machining the old rails.

In 2011, DC1 started to become more central to FlexLink's supplier base performance. At the time, FlexLink was developing a phone bracket to be manufactured in China. A phone bracket consists of a painted die-cast bracket body, two plastic injection-molded cover lids, and some bolts and nuts. The bracket is produced by DC1, and the lids are molded by IM3 (Figure 4-8). The lids do not affect the performance of the product; they are cosmetic items that add to the bracket's safety and appearance.

Normally, one of FlexLink's Swedish suppliers would purchase all of the components required from DC1 and IM3, and assemble them, or FlexLink would do that in its own assembly unit in Shanghai. However, at that time FlexLink decided to give the task to one of the Chinese suppliers, and DC1 took the initiative and proposed to take care of this task. FlexLink also preferred to have DC1 do the job rather than IM3, because, as the director of the supply chain group put it:

> *"They are the most experienced ones in China; they know our requirements very well, so we are more comfortable with them buying from IM3 than the other way around".*

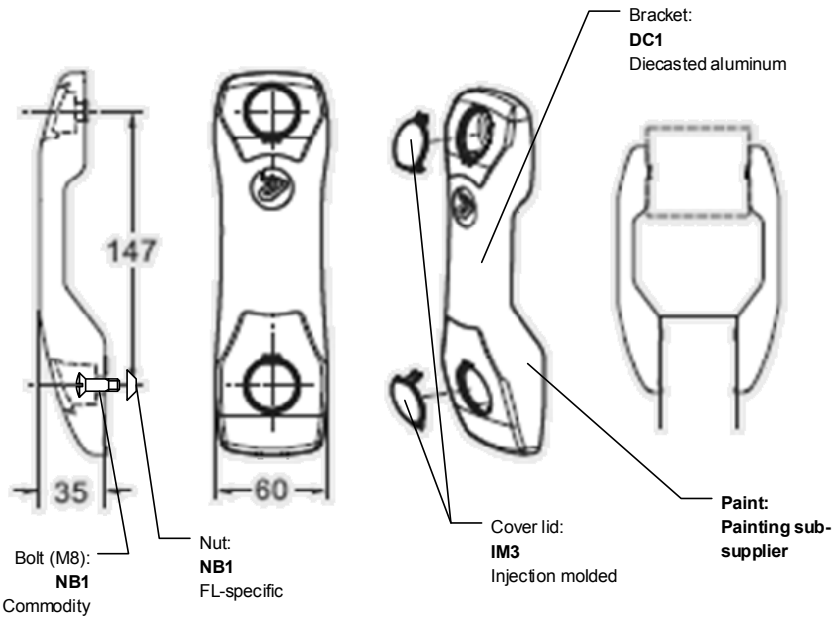


Figure 4-8: Phone bracket (an example of connected relationships)

The big process picture can be described as follows: DC1 die-casts the bracket body, removes all the burrs (the sharp edges), and sends it out for painting. After receiving the painted brackets, DC1 pre-assembles the nut and bolt (purchased from NB1[13]) and the covers (purchased from IM3) on it, puts the product in plastic bags, seals the bags, and sends them to the consolidation point in China.

The plastic lids are lighter and cheaper than the die-cast brackets. Therefore, it makes more sense for DC1 to buy them from IM3 than to transport all of the heavier and more expensive items to IM3 for assembly. Connectedness among these relationships is not greatly under FlexLink's influence. FlexLink, for instance, informs IM3 that DC1 is also allowed to make a purchase of this specific item from them at the price agreed between FlexLink and IM3. Then, DC1 regularly makes purchases from IM3 and assembles them with the items they have die-cast for FlexLink, eventually selling the complete product to FlexLink. For pricing, FlexLink agrees to pay for the additional purchased items, the assembly workers' time, and an additional margin in order to make it beneficial for DC1 to do this for FlexLink. In the event that IM3 increases the price of the item (after negotiating with FlexLink), FlexLink agreed to reimburse the extra cost for DC1. DC1 makes infrequent, large batch purchases (two to three times a year) from IM3, and stores the plastic lids until they are needed. These sales constitute a small share of FlexLink's business with IM3. The director of the supply chain group explained it this way:

> *"It is something that IM3 does because it is like a package. We buy other more expensive items from them, and then we say you also have to make the lids. So, for them it's a necessary evil to get the remainder of our business."*

Regarding the painting supplier, FlexLink visited it a few times, but does not take an active part in the relationship between it and DC1. FlexLink gives the painting specifications to DC1, and has

[13] Another supplier of FlexLink in China, not directly in contact with FlexLink's China Sourcing unit.

made DC1 responsible for ensuring it. DC1 pays this supplier, and can change suppliers if it realizes that the expected quality is not being met. The same goes for the bolts: DC1 is responsible for finding a supplier that provides bolts with proper quality at a reasonable price.

However, the situation is different for the nuts, which are uniquely made for FlexLink in order to fit in its products. The material used in making these nuts is conventional, but the dimensions and design of the nut are unique to FlexLink, and NB1 only produces them for FlexLink. FlexLink has not designed this product, but has only defined its specifications.

NB1 is a German company with a subsidiary in China, and FlexLink Sweden is one of its customers. NB1's factory in China is contacted directly by FlexLink or its Chinese suppliers, and the purchase is made directly. In Sweden, this item is bought from NB1 Germany in labeled packs of 50. Knowing that they are produced in China, FlexLink has asked DC1 to contact NB1's subsidiary in China and order the nuts there. NB1 does not deliver the nuts to DC1 in labeled packaging. DC1 buys them in full pallets, and therefore can acquire the nuts more cheaply than FlexLink can in Europe, and FlexLink avoids unnecessary transportation of the nuts between Europe and China.

In many cases, DC1 and FlexLink work together to solve their problems. For example, a variety of the products DC1 produces for FlexLink are sent by DC1 to a sub-supplier in China to be painted. In 2012, the quality of these items started to decline in terms of the paints used. DC1 took the initiative to solve this problem and improve the quality of the product; DC1 invited the painting sub-supplier and FlexLink to a meeting, where they discussed various issues related to the paint powder quality. In that meeting, FlexLink learned that although the painting sub-supplier uses paint powder from a well-known European paint producer, the quality is not satisfactory (as good as it was before). In turn, the painting sub-supplier suggested a Chinese local brand to replace its paint powder supplier. After a short while, the painting sub-supplier sent some samples with the new paint to FlexLink, and received FlexLink's approval.

In another example, some of DC1's past products had a surface quality problem. FlexLink invited DC1 representatives to its assembly unit in Malaysia for a meeting to discuss the problem with some of FlexLink's technicians. DC1 sent engineers to that meeting, and their input contributed to solving that problem.

4.4.6 Example: The problem with a connecting bracket

For most of the die-cast items, FlexLink designs the products and decides on certain specifications required for the product. Then it is the supplier's responsibility to find the proper raw material and adjust its manufacturing processes so that all specifications are met when producing FlexLink's items.

In December 2012, at one of the final stages of the development process of a new connecting bracket model, one of FlexLink's engineers noticed a problem with the product. FlexLink engineers had designed the product and received samples manufactured by DC1. When one of FlexLink's engineers was designing a sample for a different product together with a group in FlexLink's office in Germany, he accidentally broke DC1's connecting bracket sample. This showed that the product was not strong enough to withstand the loads that it is required to hold.

In the past, FlexLink used to have connecting brackets of this type made using steel. This new design, however, called for aluminum, so FlexLink's engineers decided to increase the thickness of a certain part of the product to strengthen it. In addition, FlexLink's engineers tried the three to four types of aluminum raw material that DC1 uses for FlexLink, as well as some other types of raw material, to find a way to solve the problem. Later in this process, some changes were needed in the production tools used for this product. This process required a lot of dialogue with DC1, and also FlexLink had to stop DC1 from stockpiling those faulty products.

Although this problem was rooted mainly in FlexLink's design and partially in the choice of raw materials, FlexLink demands more proactive feedback from the suppliers. For example, according to one of FlexLink's design engineers, when he asked for some feedback from one of its Swedish die-casting suppliers, the supplier commented, *"I would have never casted this product. It is obvious that it would easily break!"* The same design engineer, when interviewed, emphasized the importance of having suppliers that are willing to take the initiative on problems and provide FlexLink with feedback:

> *"FlexLink noticed the problem, and cannot blame DC1 for it. So, it was our mistake, but we need to use our suppliers as experts. For example, when it comes to raw material, the supplier should be trusted in their choice of the material, knowing the requirements from us. This is, however, less likely to happen in Europe, as the Swedish suppliers usually come back to us with feedback that, for instance, 'This part is impossible to produce.' This is perhaps a part of the Chinese culture that they prefer not to insult the customer by telling them that you are wrong. […] We don't get the criticism that we want from China. With the Swedish suppliers, it's easy to go there and discuss the functions and problems. With China we have to do this through telecom. Besides, we mostly speak to our China sourcing manager and not to the suppliers directly."*

When reviewing the new product development project of 2012 with the suppliers, FlexLink primarily focused on showing its Chinese suppliers how important it is for FlexLink to give feedback on the designs. This has made them proactively come up with some criticism and feedback on the 2013 project. This is especially important because most problems are usually realized only after the initial sample is produced by the supplier.

FlexLink used this incident as an opportunity to learn. Such problems delay launching new products, and in many cases such launches are tied to important deadlines (for example, dates of trade shows). Planning for the engineering hours, production lead time, deliveries, and other factors is a complicated task, and delaying the launch can be very costly. Hence it is valuable, according to FlexLink's director of the supply chain group, to use the experience gained from solving previous problems in future projects:

> *"There was definitely some learning from that. The next time we are going to develop a conveyor platform, we know that we need to think in another way when designing the product, which material to use not to face the same problem, etc. Of course, from this we take lessons with us to avoid the same problems in the future. But then again, there would be a risk if we have another designer in the future, the same problems may come up again."*

4.4.7 EXAMPLE: THE PROBLEM WITH FLATNESS OF STEEL-TOP PLATES

By 2013, FlexLink's relationship with MS3 had grown to be much larger than in the past. Many new products in high volumes were introduced to this relationship. One of these products was "transfer calendars," the development of which started in 2010 with FlexLink and MS3. Although from the viewpoint of FlexLink, products made by MS3 are not very complicated, the two companies have maintained a productive dialogue for solving problems that arise over time.

MS3 produces a couple of steel-top plate models, which are stocked at IDC and then bought by IM2 for assembly into two groups of products for FlexLink. In 2011, IM2 discovered a flatness issue with these steel-top plates, and its quality manager filed a complaint about it in FlexLink's complaints system. In the complaint, IM2 pointed out that the plates were crooked, and that it would like to return the whole shipment of plates because they could not be used by IM2. IM2 bears the final responsibility for the quality of the product, and with that deficient input, it could not guarantee the quality of those assembled systems that include this item.

FlexLink had proof from IM2 that the quality was not satisfactory, and felt the need to find a way to ensure the quality of the plates. At first, FlexLink forwarded the complaint to its China Sourcing unit to communicate it with MS3. In addition, the problematic batch was sent back to MS3. After MS3 reworked them, it sent samples to FlexLink, and FlexLink sent them to IM2 to approve.

In parallel, FlexLink's quality manager and one of its testing engineers discussed the matter and designed a tool for this purpose. They gave the design to a product designer in FlexLink to make a drawing. There were first some discussions at FlexLink about whether it should produce the tool and send it there, but it was decided to trust MS3 with it, given that the tool was not very complicated. The drawing of the tool was sent to MS3 (through FlexLink China sourcing) to be produced and used by it. After MS3 produced the tool, the manager of FlexLink's China Sourcing unit visited MS3's shop floor and ensured it was functioning satisfactorily. FlexLink's product quality manager and one of its quality engineers later paid a visit to MS3 for the same purpose. When interviewed, FlexLink's director of the supply chain group appreciated MS3's approach in solving this problem:

> *"So, one way was to solve the problem for the long run (changing the process and so on). But also in the short run, they (MS3) reacted very fast, and using this quality control tool, they managed to ensure the quality of the steel tops in their stock."*

The tool is used for every single steel-top plate that MS3 produces for FlexLink. It is a FlexLink-unique product, so the supplier cannot use it for other customers. According to FlexLink's quality engineer involved in this process:

> *"You have to trust them that they use it. […] We are not doing it for us only, it's for them, too. If they produce another batch and it is out of tolerance, it would be a problem for them, too."*

4.4.8 EXAMPLE: THE PROBLEM WITH THE WHEEL BEND DISCS

One of the products IM3 has manufactured for FlexLink since 2008 is the wheel bend disc. The product was previously produced by IM1 in China (2005–2008), and before that by IM4 in Sweden (until 2005). Since the time IM1 was responsible for this product, there have been some problems

with the product. The problems primarily involved the wheel bend disc being manufactured out of tolerance, which made noise when in operation in the conveyor systems designed using FlexLink products. Throughout these years, at various points in time, FlexLink and the respective suppliers' engineers have spent a lot of time and effort to solve the problem, but have not yet been successful.

When FlexLink introduced this product into its relationship with IM3, it already knew that this is going to be a difficult problem. FlexLink's product quality manager felt that this product was too complicated to be ordered from IM3, given the limited development of that relationship and the long geographical distance. To solve this problem, FlexLink did not move its production tools related to this product from IM1 to IM3. Instead, it asked IM3 to make new tools and start producing the wheel bend discs with them. As another part of efforts to solve this problem, FlexLink developed a test tool and had IM3 use it. Many discussions have taken place with IM3 about the raw materials and the manufacturing processes. FlexLink's product quality manager has visited IM3 a couple of times to attempt to solve this problem, but none of those visits has produced a solution.

When product development began at IM3, FlexLink tried numerous times to ask what IM3 employees think about the product, and if they think FlexLink can improve it in any way, but FlexLink never received any feedback. One of FlexLink's quality engineers addressed this issue: *"That's a problem with some of the Chinese suppliers; when you have problems, it's not so easy to receive feedback or suggestions for solutions. You basically have to find it out yourself."* FlexLink's product quality manager also emphasized another dimension of this problem: *"This is one the problems; they don't speak English. We have to use our organization channel in China to transfer the information and then back again. […] When we meet them, it's very hard to get any ideas or feedback. They (IM3) keep saying, 'No, we don't have any problem!"* Therefore, FlexLink took the initiative to handle this problem with the wheel bend disc tolerances.

In parallel, FlexLink's product quality manager decided to seek help from an old friend, a former production manager for IM2. During the long-term relationship between FlexLink and IM2, for around 20 years, the two managers had cooperated many times, helped each other in solving many of their problems, and become friends in the process. By 2013, when FlexLink decided to take a more active role in solving this problem, that former production manager had resigned from IM2 to start his own tool manufacturing business. His business relies very much on China sourcing, and in the past he had obtained help from FlexLink's product quality manager a couple of times to discuss and solve his own company's problems in China. However, his company was not a supplier to FlexLink.

With this background, FlexLink's product quality manager asked this friend to accompany him and to bring one of his Chinese engineers to a visit to IM3 to solve the problem with the wheel bend discs. Their idea was to monitor the process for a day, and see if they could find any potential for improvement. However, they did not find any major deviations from the process and could only suggest a few minor adjustments to the drying process. What makes this specific problem difficult to solve is that the tolerance deviations are not visible when the manufacturing process at IM3 is complete. They happen over time, and that means that identifying their cause requires following the product beyond the manufacturing process at IM3 to see how the dimensions change.

The problem is not yet completely solved. In a further attempt, FlexLink developed test tools to be able to run some test rounds in Sweden in collaboration with its European plastic raw material suppliers (PR1 and PR2). It is an ongoing project. The product quality manager at FlexLink highlighted the importance of having a supplier with a proactive approach and maintaining an efficient dialogue with them:

> *"It is most likely a problem with the design. But if you have a good supplier, they should tell you that, and then we could have the discussions on how to improve it. But with this supplier they never did that. […] This is too heavy of a problem to solve in China, and also given that the supplier is not strong enough, we have to guide them through all the way. But we cannot do that. We need a supplier that can be our speaking partner, so to say.*"

IM3 still produces the product with the quality problem. FlexLink's plan is to keep investing and working on the problem in Sweden and then apply the solution, when found, in IM3's manufacturing processes. In the view of FlexLink's product quality manager, collaborating with IM4 (in Sweden) on solving this problem could be very promising, but he finds it difficult to return to IM4 and use its expertise in solving this problem, mainly because FlexLink has taken back the production tools related to this product from IM4 and stopped ordering this item from IM4 many years ago.

FlexLink's director of the supply chain group emphasized the importance of IM3's openness when facing this specific problem:

> *"That type of a relationship where the supplier would accept that someone from the outside comes into their shop floor and adjusts the machines. That is something that FlexLink will hopefully benefit from in the future, in terms of higher product quality, fewer complaints, and so on. […] I think in general, if you are looking for very stable and long-term relations, that makes the suppliers more comfortable and more willing to take an extra effort, in, for instance, making a FlexLink corner in the factory, because the supplier knows that we are here for another five years, unless of course something radical happens. So, if you are looking for these extended relationships with the suppliers over time, then it interests the suppliers to invest time and money into maintaining the relationship in a good way."*

Furthermore, FlexLink's director of the supply chain group believes that this has helped to enhance FlexLink's image and reputation in the market. By paying several visits to the supplier and investing in solving a specific problem with the quality of its products, FlexLink shows its cooperative and supportive approach when dealing with its business counterparts. This, in the opinion of FlexLink's director of the supply chain group, shows that if there is a problem with a customer, FlexLink acts quickly and tries to solve that problem, too.

5 Case analysis

The case described in the previous chapter includes a variety of developments in FlexLink's supply network over a period of 13 years. This chapter presents an analysis of those developments. In the analysis, different developments in FlexLink's supply network are captured using the theoretical tools provided in section 2.4. The problem discussion and the research questions are then approached in chapter 6, building on the case analysis presented in this chapter.

Because this analysis is intended to be close to the case, this chapter is structured in line with the empirical description, and is based on the technology areas. FlexLink has a wide range of supplier relationships, and each supplier undertakes a variety of operations. In order to structure the analysis, the suppliers are grouped with regard to how each supplier relationship fulfills FlexLink's needs in one of the technology areas. Here, the basis for grouping is what the supplier does in relation to FlexLink, and not its operations in general. Various technology areas were defined and used in the case description for anonymizing the supplier names (see the introductory description in chapter 4. In this chapter, the analysis focuses on only four technology areas, because those areas constitute developments in FlexLink's supply network that are found to be the most relevant to the analysis provided in chapter 6. The technology areas analyzed in this chapter are plastic injection-molding, aluminum and zinc die-casting, machining, and stamping, and stainless-steel die-casting. Each technology area centers on developments in relation to the suppliers in that technology area, while in many instances those developments may relate to developments in other technology areas. The interconnectedness among different supplier relationships of FlexLink is embraced, and also drawn upon throughout the thesis, and specifically in this chapter.

5.1 DEVELOPMENTS IN FLEXLINK'S PLASTIC INJECTION-MOLDING TECHNOLOGY AREA

Perhaps the most strategic supplier relationships of FlexLink are with the two major plastic injection-molding suppliers, IM2 and IM4. Both of those suppliers manufacture important products for FlexLink. IM4 manufactures various models of plastic chains, which are required in all systems designed and sold by FlexLink. The plastic chains manufactured by IM4 rank among the product types with the highest volumes of sales. The products manufactured by IM2 are more customized, but are still high-volume items.

IM2 is the most reliable partner for FlexLink when it comes to developing new plastic injection-molded products, or solving technical problems related to them. FlexLink has been involved in both relationships for a long time, especially in the case of IM2 and FlexLink, which have been together since the founding of FlexLink as a company. Every year, various instances of new product development and technical problem-solving between FlexLink and those suppliers become important sources of economies of innovation for FlexLink. Every time FlexLink plans to develop a new product that requires plastic injection-molding technology, product design engineers in FlexLink interact on various occasions with the production engineers at IM2 or IM4, depending on the type of product (see Figure 5-1). Their interactions usually involve technical issues related to the functionality of the product, as well as its manufacturability. Through those interactions, FlexLink and IM2 or IM4 adapt their resources to each other; the product design is adapted to the machinery at the supplier, so that it can be efficiently manufactured, and the machinery of IM2 and IM4 are adapted to the product design, so that they can be used to

manufacture the new product to meet FlexLink's specifications. Over time, the frequent cooperation between engineers in those firms has made them comfortable working together; so for FlexLink's product design engineers, the most preferred source of help for solving their technical problems is the engineers at IM2 and IM4.

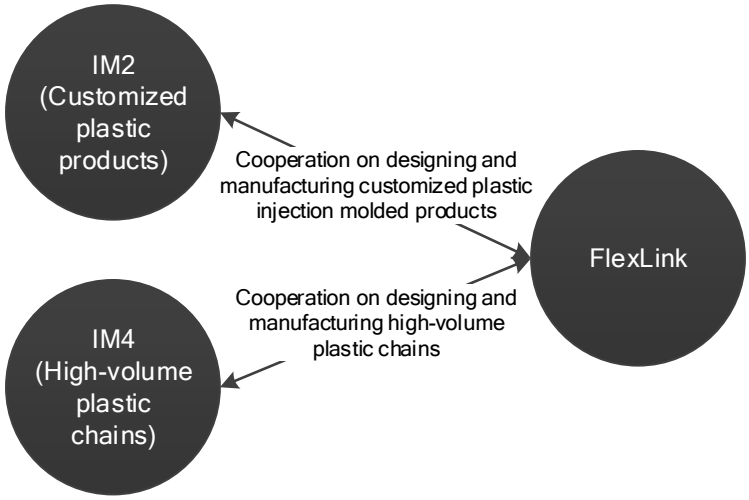


Figure 5-1: FlexLink's close relationships with IM2 and IM4

FlexLink's relationships with IM2 and IM4 contribute an important feature for the analysis; IM2, IM4, and FlexLink are all connected to two suppliers for manufacturing tools (TM1 and TM2). Manufacturing the tools is an important part of the process of plastic injection- molding. The tools are very expensive, and each tool can only be used to manufacture one product model. Each tool needs to be designed so that it can be assembled properly on IM2's and IM4's machinery, and can be efficiently used to manufacture the product designed by FlexLink. Hence, every time a new plastic injection-molded product is developed, or a technical problem with such products needs to be addressed, FlexLink, IM2, and IM4 cooperate with TM1 and TM2, and through that interaction gain economies of innovation by connecting multiple relationships to each other.

The cooperation includes interactions between all parties in different forms. IM2's and IM4's input to the cooperation is usually from a user's perspective; they inform TM1 and TM2 of the technical issues when assembling and using the tools on their machinery, and share their viewpoints on how to design and manufacture the tools so that they can use them more efficiently. FlexLink contributes its input on design of the product that is supposed to be manufactured by the tool, and TM1 and TM2 share their viewpoints regarding how the tool can be more efficiently manufactured or fine-tuned (in the case of solving a problem that occurs in the middle of using a tool). The cooperation between FlexLink, IM2, IM4, TM1, and TM2 involves various interactions, including meetings for sharing of ideas, phone calls, and exchange of sample products and designs, and it is vital in FlexLink's achievement of economies of innovation through connecting relationships every time a new plastic injection- molded product is developed or a problem with such products needs to be solved (see Figure 5-2).

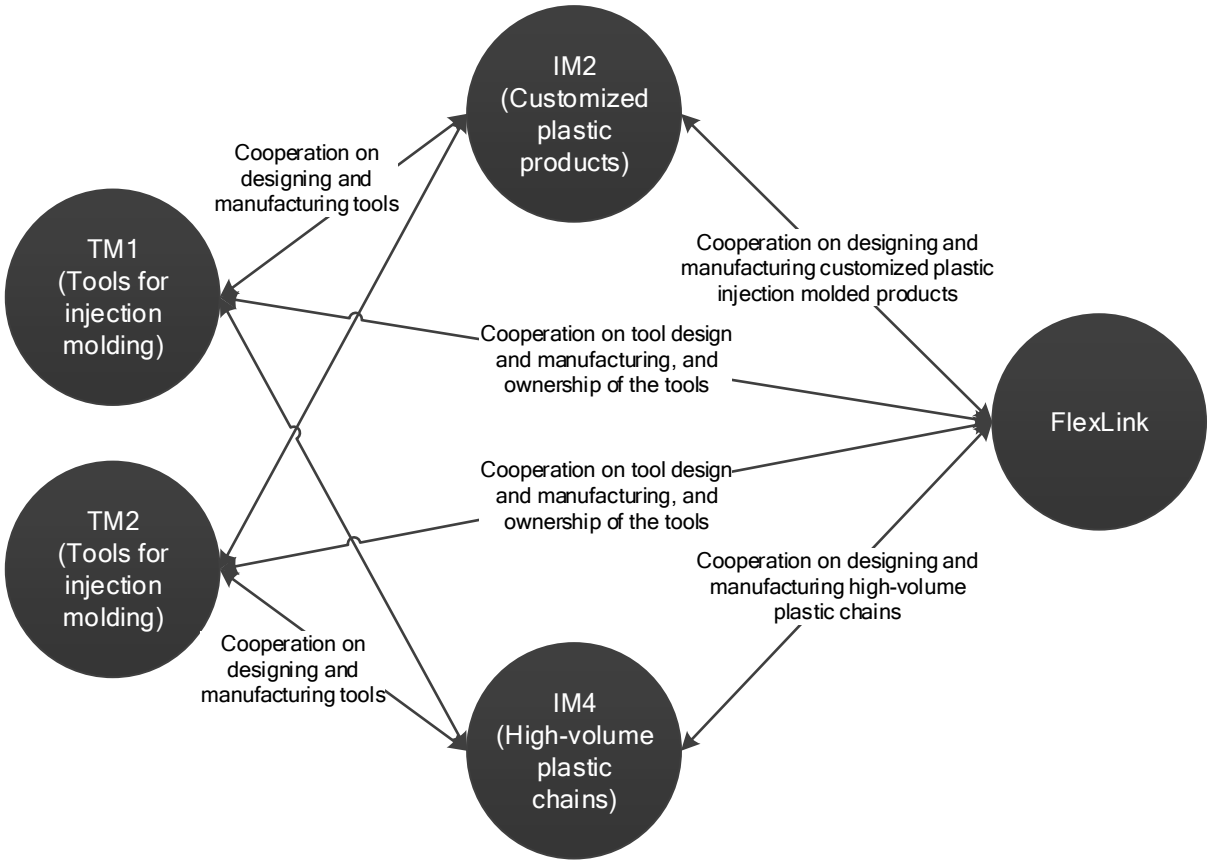


Figure 5-2: FlexLink's connected relationships with tool manufacturers for plastic injection-molding

Another way of economizing on innovation is shown in FlexLink's connected relationships with plastic raw material suppliers (see Figure 5-3). Developing many new plastic injection- molded products of FlexLink has been inspired by the new plastic raw materials that are developed by PR1 or PR2 and sold to IM2 and IM4. On an occasional basis, engineers from PR1 and PR2 visit FlexLink's product design engineers and discuss their new products. FlexLink's engineers apply the knowledge of the features of the new raw materials to new product development. New features mean new opportunities for product development, and that is important in FlexLink's cooperation with IM2 and IM4 for new product development. This is also the case when FlexLink attempts to solve technical problems with its plastic injection-molded products. A fitting example is the problem described in section 4.4.8, in which FlexLink was experiencing a problem with the quality of a model of wheelbend discs manufactured by IM3. Previously, the product was manufactured by IM1, and before that by IM4. During the time IM4 manufactured the product, this quality problem did not exist. After moving the production to IM1, the problem appeared, and the termination of FlexLink's relationship with IM1 and the move of production to IM3 also moved the problem to IM3. FlexLink tried various ways to solve the problem, among which was the use of PR1's and PR2's help in designing test tools and conducting raw material tests.

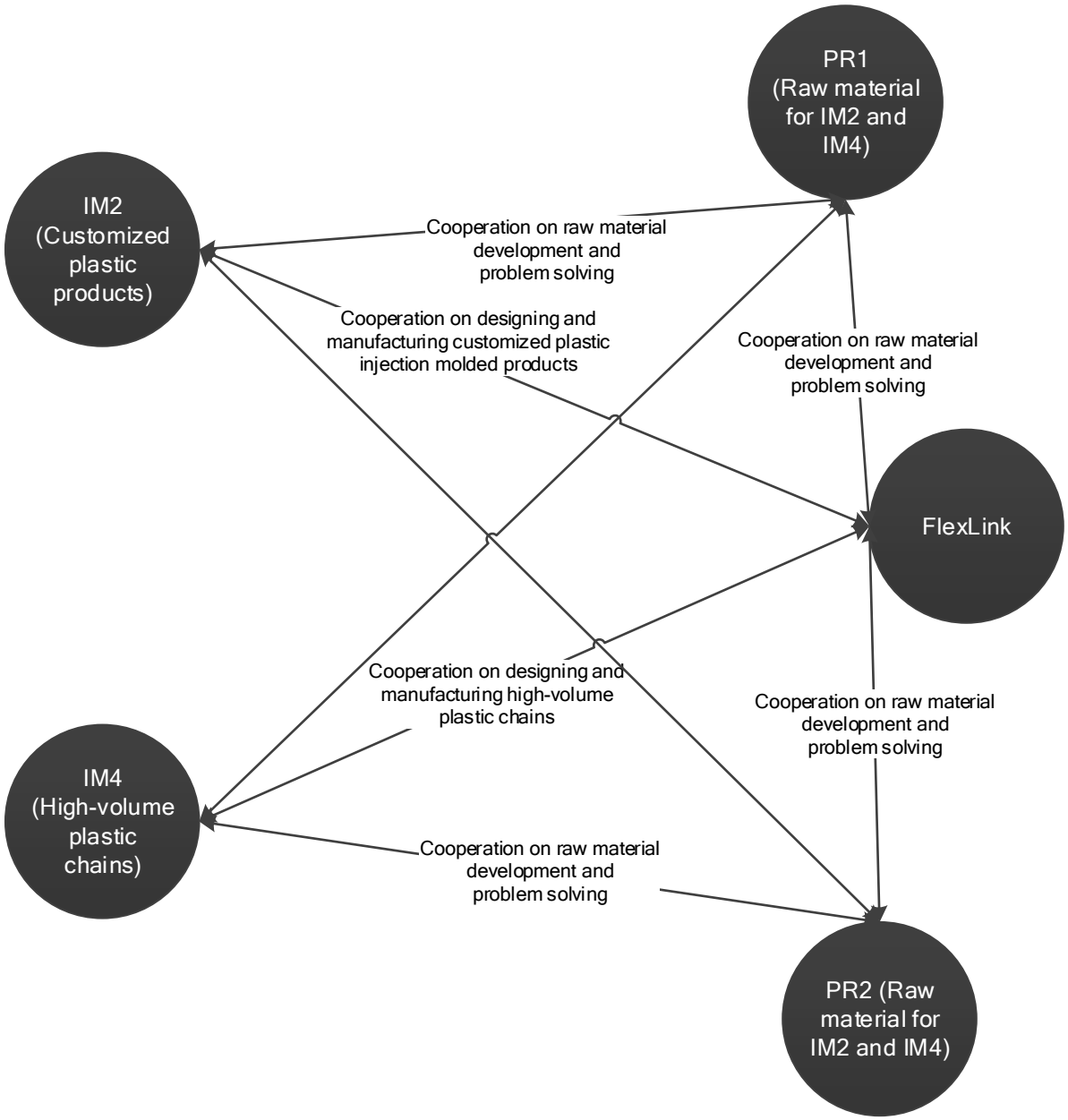


Figure 5-3: FlexLink's connected relationships with plastic raw material manufacturers

As described above, FlexLink's economizing on innovation in the plastic injection-molding technology area is, in various instances, made possible through relationships that are connected with the FlexLink–IM2 and FlexLink–IM4 relationships (see Figure 5-4). FlexLink alone cannot develop new plastic injection-molded products; it needs the technical help of IM2 and IM4 in the development of the products. However, new product development between FlexLink, IM2, and IM4 usually also requires technical discussions with TM1 and TM2, because the injection-molding tools are such a vital part of the process. Besides, cooperation with the raw material suppliers, PR1 and PR2, has been an important source of economies of innovation for FlexLink, because with their help it has been able to design new products that would have not been possible without that cooperation. This has also been the case for technical problem-solving; on various occasions, FlexLink has needed the help of IM2 and IM4 to solve technical problems, and has used the assistance of TM1, TM2, PR1, and PR2 in solving various problems in its other supplier relationships.

Connecting those relationships to each other is an important attempt by FlexLink to economize on innovation. Those economies of innovation are achieved through various resource adaptations and interactions among different types of actors. For example, when a new plastic injection-molded product is being developed, the design of the product, the plastic injection-molding machinery at IM2 or IM4, the tools designed by TM1 and TM2, the tool manufacturing facilities of TM1 and TM2, and in some cases the raw materials manufactured by PR1 and PR2 are adapted to each other through various interactions between engineers in different business units in those firms. Those interactions are an important enabler of those adaptations, and those adaptations make it possible for the firms to interact more.

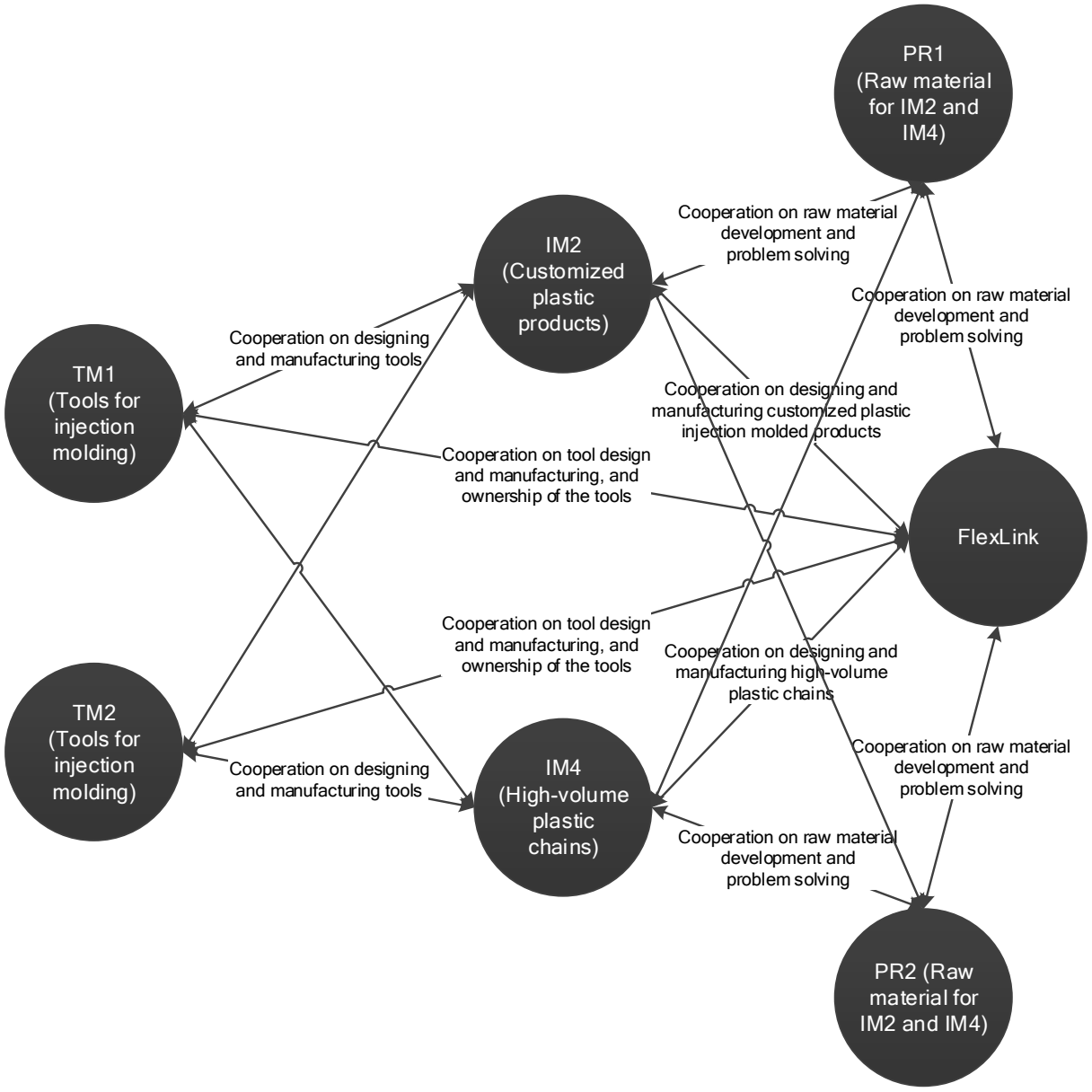


Figure 5-4: FlexLink's economizing on innovation across multiple relationships for new product development and problem solving in the area of plastic injection-molding technology

In the period from 2004 to 2009, FlexLink took many of its new products to China and used the help of its Chinese suppliers for their development and production. At the same time, FlexLink was facing difficulties in earning the expected margins in its relationship with IM2, and hence decided to press IM2 to cut its prices. This had a negative impact on the atmosphere of the

relationship between FlexLink and IM2, resulting in IM2 attempting to formalize every interaction and exchange with FlexLink. This made it difficult for the engineers at the two firms to continue their previously very frequent interactions, because the new management of IM2 had decided to follow their contracts word by word and not to put any additional efforts in FlexLink's favor that were not strictly required by the contracts. Therefore, opportunities for co-evolution of FlexLink and IM2 were reduced, resulting in the two firms having less opportunity to identify the potential benefits of unexplored combinations of their resources. The main reason for this was that every new change in the use and characteristics of IM2's resources, in relation to FlexLink's resources, had to go through formal contracting. One result of FlexLink's actions in pressuring for price reductions became over-formalizing of the relationship, and this damaged the relational atmosphere. Furthermore, during this period, FlexLink started to source a series of new plastic injection- molded products in China, and that slowed the pace of developing new products with IM2.

While the relationship between FlexLink and IM2 was becoming more formalized and less likely to result in economies of innovation (compared to the previous period), FlexLink decided to terminate its relationship with IM7. This decision had an important impact on FlexLink's relationships with IM2 and IM4. By shifting the business volumes from IM7 to IM2 and IM4, various new activities were added to IM2's and IM4's activity structures, which were similar to the existing activities at IM2 and IM4 in their need for resources. By increasing the similar activities undertaken by IM2 and IM4, FlexLink improved its utilization of the production facilities of the two suppliers, and in this way economized on scale and scope in those two relationships.

Meanwhile, FlexLink urged IM2 to find more customers, to prevent becoming too dependent on FlexLink. This would enable FlexLink to economize on scale and scope by sharing the resources of IM2 with other customers and creating more possibilities for IM2 to increase the similar activities that it undertakes using its resources, while making it less likely that IM2 would be severely affected if FlexLink faces problematic economic circumstances (such as the problem and its causes described at the beginning of this section). However, IM2's establishment of relationships with other customers also presented challenges for its relationship with FlexLink. As a consequence of this change, during that period FlexLink received less attention from IM2, because IM2 then had to adapt its resources to the resources of more actors. This in turn made it more difficult for FlexLink to explore versatility potentials of IM2's resources as freely as it could in the past. It had become more difficult for IM2 to combine its resources (such as production facilities, engineers, and others) with the resources of multiple actors, than when FlexLink was the primary actor whose resources needed to be combined with IM2's. This made co-evolution more difficult for FlexLink and IM2, because now IM2 had to consider the needs of various other actors in its evolution.

Meanwhile, FlexLink continued to develop new injection-molded products in collaboration with IM2, and over time, the damaged relationship atmosphere improved. The incoming flow of new products into the relationship provided various new opportunities for the two actors to combine their resources in new ways; IM2's production facilities and engineering knowledge was recombined in various new ways with FlexLink's engineering and design knowledge, as well as new products. This facilitated co-evolution of FlexLink and IM2, as IM2 remained the most preferable supplier for FlexLink's engineers to work with on technical solutions, and for quality

and tooling discussions during development of every new product involving injection molding. Versatility of resources of the two firms are continually explored for further combination potentials, as new products are developed and new solutions are applied to different problems. FlexLink economized on innovation in its relationship with IM2 by achieving those new solutions and products. These discussions and exploration of combination potentials of resources between the two actors are so important for FlexLink that they constitute one of the key reasons behind FlexLink's conservativeness in moving IM2 products to IM3 in China: specifically, FlexLink cannot ensure that the collaboration it enjoys with IM2 can be achieved with IM3. An example of such difficulties in joint problem-solving with IM3 was the steering guide problem that arose in 2013 (see section 4.4).

Moreover, over a long period of time the engineers at FlexLink and IM2 maintained and improved their feelings of closeness to each other, continually interacted, and maintained their belief in each other's capabilities. Despite the slower pace of expansion of business volumes in this relationship, high jointness can be observed in this relationship, as multiple individuals of the two firms maintain daily contact regarding issues such as logistics, purchase-related problems, and project plans. FlexLink and IM2 have various sequentially interdependent activities; the products manufactured by IM2 are designed by FlexLink in collaboration with IM2, and IM2 produces those products partly based on its internal production planning considerations and partly with regard to FlexLink's inventory plans and long-term demand forecasts. The sequentiality of such activities between IM2 and FlexLink are handled through daily contacts between the two firms, and constant coordination of FlexLink's inventory management plans, IM2's production plans, and logistical discussions. These joint efforts provided the opportunity for FlexLink to economize on integration in this relationship by maintaining high jointness with IM2 to handle sequentiality of their activities over a long period of time.

In contrast to FlexLink's relationship with IM2, the FlexLink–IM1 relationship never became satisfactory, either to FlexLink or IM1. During the few years that FlexLink and IM1 had a relationship, it did not expand. IM1 was interested in acquiring the high-volume chains business from FlexLink, but FlexLink did not see this as a good fit. This became a reason for IM1 to view its expectations of this relationship as overestimations. Over time, IM1 realized that FlexLink's business would not provide a satisfactory utilization of IM1's resources, and FlexLink's refusal to give IM1 the chains business meant no satisfactory increase in activities with similarities in the use of resources in the FlexLink–IM1 relationship. This conflict of objectives, and eventually FlexLink's refusal to expand the business with IM1, became the starting point for the termination of the FlexLink–IM1 relationship.

In 2008, FlexLink's decision to refuse to expand its relationship with IM1 through the introduction of the high-volume chains business was concurrent with IM1's decision to expand its customer base and its loss of interest in FlexLink's business. To IM1, other existing and new customers had become more important than FlexLink for interaction. IM1 managed to increase similarity among activities directed at different customers, and managed to better utilize its resources by giving those other customers access to IM1's resources, while deprioritizing activities related to FlexLink. This reduced the possibilities for exploring versatility of IM1's resources for combination with FlexLink's resources. IM1 economized on scale and scope in relation to the activities it prioritized to undertake using its resources, but FlexLink-related activities were not among the prioritized

ones. IM1 did this by focusing on adapting its resources with the resources of its other customers, rather than with FlexLink's resources. The FlexLink–IM1 relationship was eventually terminated in 2008, when FlexLink established a relationship with IM3 to replace IM1.

Figure 5-5 briefly illustrates the developments described in the paragraphs above. In summary, the damaged relationship with IM2, which was in one way a result of FlexLink's expansion in China sourcing (the relationship with IM1), was improved by ending the relationship with IM7, encouraging IM2 to find new customers, and other measures. In parallel, the relationship with IM1 became more problematic, due to IM1's approach towards the FlexLink relationship in relation to its other customer relationships; hence, FlexLink ended that relationship and established a new relationship with IM3.

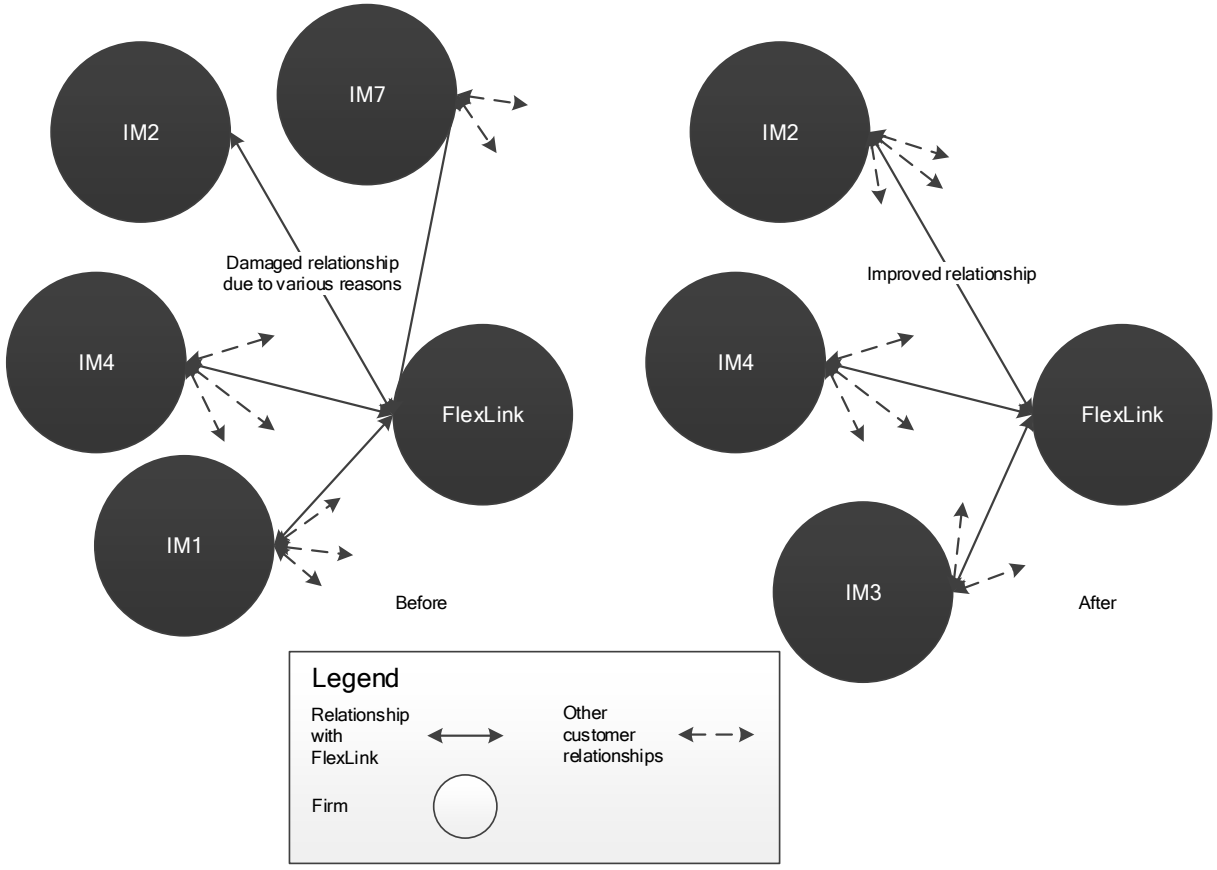


Figure 5-5: Developments in FlexLink's supplier relationships, centering on the relationships with IM2 and IM1

Another development in FlexLink's supply network in the plastic injection-molding area was the problem with the wheelbend discs. As discussed above, IM2 was the supplier for those items, before FlexLink decided to source them from China. When FlexLink decided to move the production of those items to China, IM1 was the plastic injection-molding supplier in China with which FlexLink had a relationship. The move of the product involved moving the technical specifications, but despite FlexLink's efforts in transferring the technical details from IM2 to IM1, the wheelbend discs manufactured by IM1 had a quality problem with their tolerances. The difficulties in technical adaptations of the resources involved, and the differences between how actors interacted in the two settings (before and after the moving of production to IM1) can explain this problem. The item was previously designed to be manufactured using a certain tool that TM1

had manufactured for one of IM2's plastic injection-molding machines. During that process, the product, its design, the molding tool, and the machine were all adapted successfully to each other.

FlexLink's high-involvement relationships with IM2 and TM1 included various interactions for problem-solving. The product quality manager of FlexLink finds IM2's approach to problem-solving exemplary; IM2 proactively found technical problems with the design or manufacturing of the products, and took the time to reflect on the performance of FlexLink and the other firms with which it was involved. Such an approach to relational and inter-relational interaction may have been an important reason why this specific problem with the quality of the wheelbend discs was not evident when IM2 manufactured them. In addition, IM2's experience with the plastic injection-molding technology was an important factor. However, FlexLink's relationship with IM1 lacked such qualities; IM1 did not reflect on the problem, and even after FlexLink discovered the problem, IM1 was not able to solve it, nor did it invest in doing so.

In 2008, the problematic interactions in the FlexLink–IM1 relationship and other problems eventually ended FlexLink's relationship with IM1. The manufacturing of the wheelbend discs was then moved to IM3, the new supplier FlexLink had established a relationship with in China. Production at IM3 also experienced the problem with the tolerances of the wheelbend discs. FlexLink's relationship with IM3 was more interactive than its relationship with IM1; FlexLink's product quality engineers spent a lot of time working with IM3's production engineers to solve the problem, but they did not succeed. In 2013, the product quality manager of FlexLink decided to ask for the help of an old friend to solve this problem; this friend was an engineer who formerly worked at IM2 as the production manager, with whom FlexLink's product quality manager had an experience of 20 years of collaboration. At the time, the engineer did not work for IM2 anymore, and had his own company in China. The engineer agreed to visit IM3's shop floor together with FlexLink's product quality manager, and try to solve the problem. The visit resulted in a number of technical recommendations for IM3, which slightly improved the quality of the product, but did not completely solve the problem. FlexLink's attempt to solve the problem can be understood as their economizing on innovation by relating actors to each other. The old friend of FlexLink's product quality manager was an important personal contact that was used by FlexLink to help improve how the resources of FlexLink and IM3 are combined.

5.2 Developments in FlexLink's aluminum and zinc die-casting technology area

Apart from the injection-molding business, another area of major changes in FlexLink's supply network was the die-casting business. The first development to focus on in this technology area concerns the early years of FlexLink's sourcing in China. In 2002, in accordance with the decision of FlexLink's owners, as well as some cost-cutting initiatives of the Product and Supply division, FlexLink decided to start sourcing in China. This sourcing was in the form of establishing a relationship with an import/export agent (IE1) to purchase simple aluminum die-cast products from a few Chinese suppliers. However, such a distant approach to suppliers was not what FlexLink was looking for in China sourcing. Collaboration with suppliers is an important part of FlexLink's sourcing strategies; all of FlexLink's production and most of its assembly is undertaken by its suppliers, and FlexLink finds it important to collaborate with them. Those collaborations have proven important in FlexLink's success in working with its supply network. Hence, working with suppliers only through an agent meant limiting possibilities for gaining various economies

that FlexLink pursues in its other supplier relationships – better coordination of operations, more efficient production, developing new products, or ensuring high-quality production.

In 2004, FlexLink decided to start up a sourcing unit in China and establish its own supplier relationships. Having a sourcing unit in China was important for FlexLink, because collaboration is central for FlexLink in achieving those economies in its supplier relationships in China. FlexLink needed to have engineers in China dedicated to supporting the suppliers and interacting with them to solve different kinds of problems, serving as FlexLink's "extended eyes and ears[14]" in China. With the help of the China Sourcing unit, FlexLink established relationships with a handful of suppliers in China, one of which was DC1.

The beginning of the relationship can be described as dual sourcing of a simple product, a model of angle brackets. That model was at the same time manufactured by DC4; however, FlexLink wanted to avoid the risk of receiving low-quality products, and hence decided to add DC1 as a dual source to DC4 for the angle brackets. This reduced FlexLink's ability to achieve economies of scale in either of the two supplier relationships with regard to the angle brackets, but it was an important step for FlexLink in its long-term plans for sourcing in China. The total volumes of the angle brackets that FlexLink needed were more than what it asked DC1 and DC4 each to manufacture. However, the dual-sourcing approach meant that FlexLink had to divide the volumes between DC1 and DC4. The resources of DC1 or DC4 utilized for manufacturing those angle brackets could have been better utilized had FlexLink not employed the dual-sourcing approach, and had instead sourced all of its demand for angle brackets from one of the two suppliers. This took place only after FlexLink had worked with DC1 for a limited period through dual sourcing and had received satisfactory results from the relationship. In 2005, FlexLink stopped ordering angle brackets from DC4, and sourced them only from DC1 to create scale in DC1's production. Figure 5-6 illustrates those developments.

[14] According to FlexLink's product quality manager.

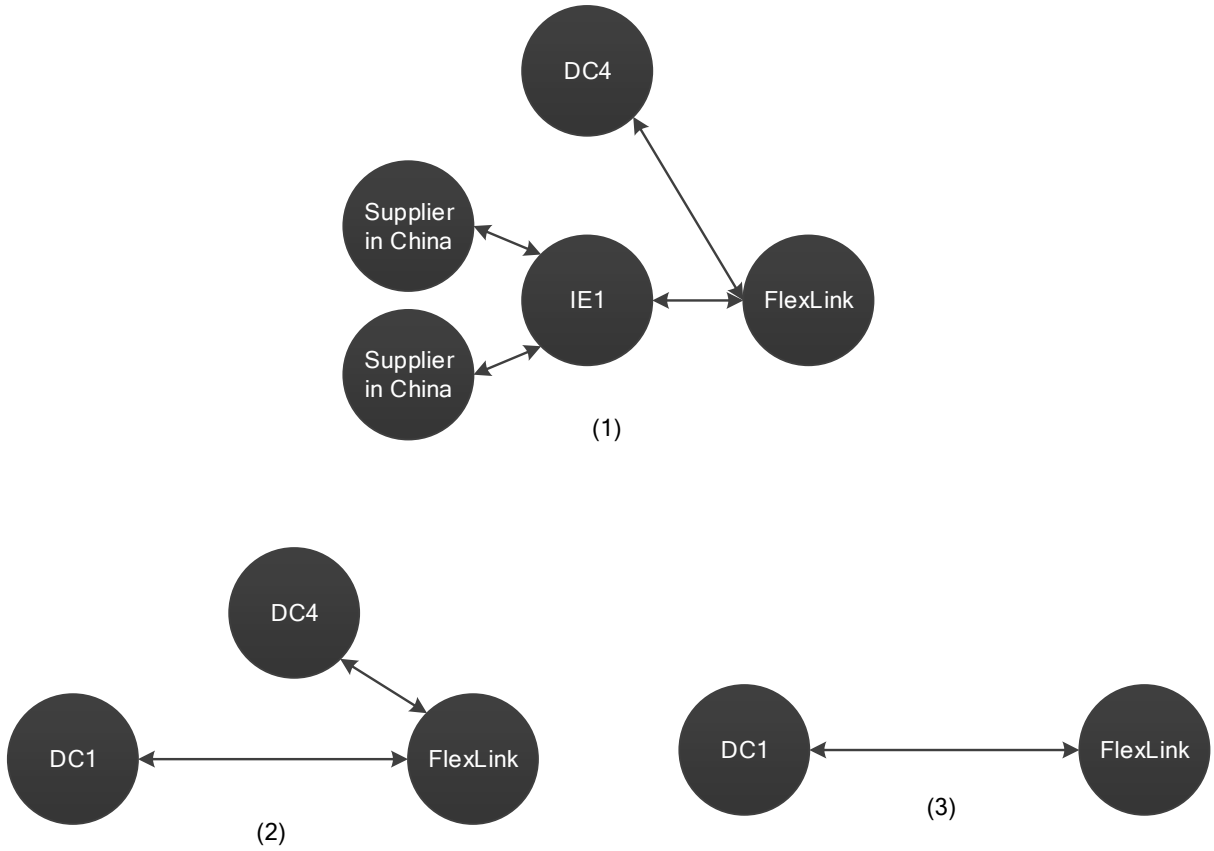


Figure 5-6: FlexLink's change of sourcing approaches to increase possibilities for collaboration

Idler ends and drive units are two of the most important die-cast products of FlexLink. Using its supplier relationships in China, FlexLink was able to introduce small and medium-sized idler ends and drive units, a product development project that brought FlexLink new sales possibilities for small and medium-duty production logistics systems. In 2005, FlexLink seized the opportunities offered by its supplier relationships in China to add those products to its offering. The low-cost tool manufacturing, machining, and aluminum and zinc die-casting operations in China, together with the improved relationships with DC1 and MS3[15], were important in FlexLink's achievement of such benefits. The low-cost operations were important because the light-duty versions of idler ends and drive units were supposed to be sold at cheaper prices than the heavy-duty models, but FlexLink's supplier relationships in Europe could not offer such cost advantages. Besides, by the time the new product development project started, FlexLink's relationships with DC1 and MS3 had become more interactive and the parties were interested in collaborating more. Both DC1 and MS3 had managed to deliver products with satisfactory quality to FlexLink, and FlexLink found it possible to take this important step in developing its relationships with DC1 and MS3 by developing new light-duty models with them.

Having these new versions of the products in FlexLink's catalogue was strategically important for FlexLink, as they had been requested by many of FlexLink's customers for a long time. FlexLink's active exploration of the versatility of its Chinese suppliers' resources played a vital role in the achievement of such benefits by FlexLink. Developing new versions of idler ends and drive units required developing new spacers, shafts, side plates, and other items. The suppliers involved in

[15] The machining and stamping supplier in China.

this product development project were, therefore, a variety of suppliers with different technologies and capabilities in China and in Europe. During this process, FlexLink and those suppliers co-evolved; FlexLink complemented its product catalogue and gained the possibility of satisfying more customers, since the suppliers were now able to use their resources in new ways by recombining them with the resources of FlexLink. This development can hence be viewed as FlexLink's economizing on innovation in its supply network.

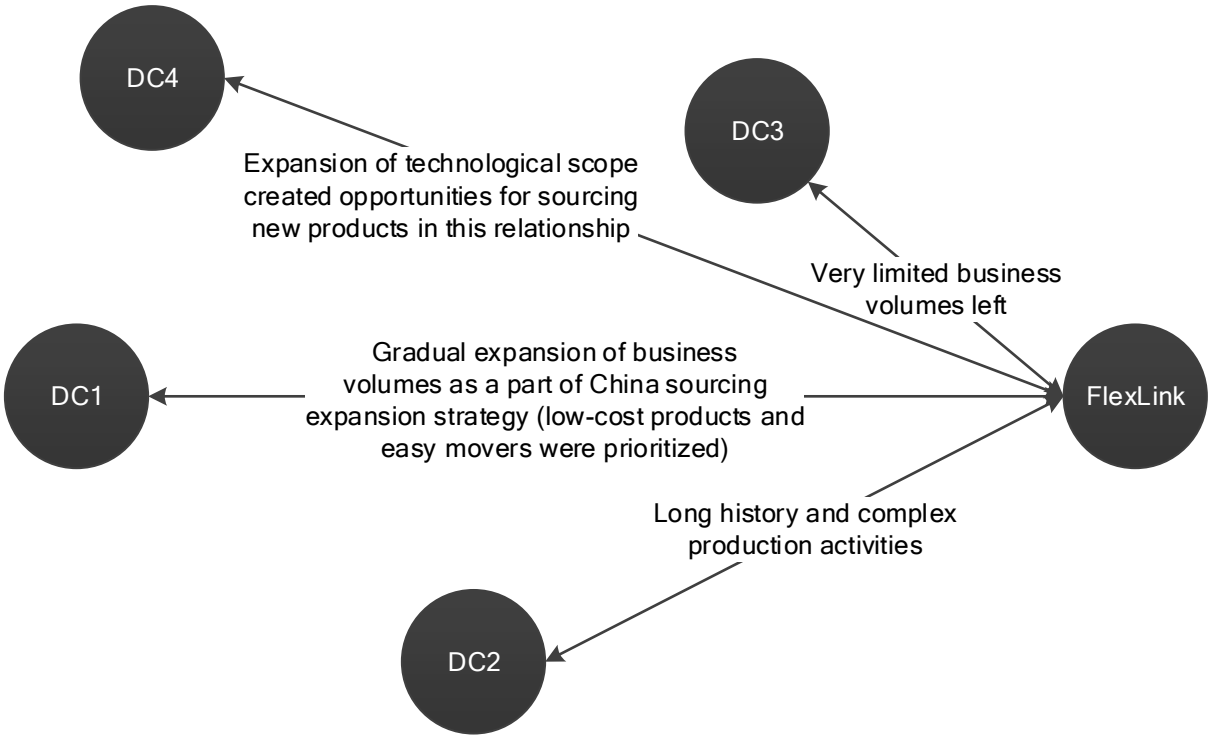
This development was accompanied by FlexLink prioritizing the maintenance of existing production in Europe, and starting production of new products in China. This enabled FlexLink to economize on scale and scope, through having the European suppliers continue using FlexLink's production tools as long as those tools worked properly. If a tool needed to be changed because it wore out, or if a new tool was needed as a result of new product development, then the Chinese suppliers were in many cases the first candidates. This development allowed FlexLink to let its high investments in production tools pay off by not stopping to utilize them too early.

A major development in FlexLink's die-casting business concerned DC4 and DC1. In the period between 2004 and 2009, FlexLink moved about 30% of the business volumes from its relationship with DC4 (in Europe) to DC1 (in China). These items included "fast movers" (meaning items that could be moved to China more easily than the other items), and this development took place over multiple years. This development had two contradictory implications for FlexLink's economizing on its supply network. On the one hand, in the FlexLink–DC1 relationship, increased utilization of DC1's resources and the addition of new activities that have similarities with previous activities of DC1's activity structure enabled FlexLink to economize on scale and scope. On the other hand, the opposite happened to FlexLink's relationship with DC4, where achieving economies of scale and scope became more difficult as a result of reduced business volumes and varieties of products.

However, DC4 reacted to this change from FlexLink by widening its technological scope and offering new possibilities to FlexLink. As a result, DC4 and FlexLink co-evolved; DC4 expanded its knowledge, skills, and capabilities, and explored the versatility of its resources for new combination potentials, as FlexLink gained the possibility of combining its resources in a new way with DC4's resources and maintained the relationship. Hence, FlexLink's initial change and DC4's reaction to it resulted in economizing on innovation for both parties involved. Nevertheless, widening the scope of activities meant reduced similarity among activities undertaken by DC4, and thus decreased the utilization of DC4's resources. With new capabilities, if DC4 intended to achieve economies of scale and scope, it was important for them to find possibilities for also utilizing those same resources in relation to its other customers. Therefore, the expansion of DC4's resource base became an opportunity for it to access new possibilities for expanding its other customer relationships, and to increase the scale of its resource utilization in the future.

The move of die-casting operations to China was not limited to the operations undertaken by DC4. Prior to 2011, FlexLink had moved the production of a large part of its products away from DC2, DC3, and DC4 to DC1. In 2011, FlexLink realized that its relationships with the three suppliers in Europe (DC2, DC3, and DC4) lacked scale. FlexLink's solution was to consolidate business volumes. All of those suppliers were capable of manufacturing each other's products, but FlexLink's relationships with each of those suppliers was different from the others.

FlexLink had a long-lasting relationship with DC2, which included a lot of important production operations that were difficult to move to China, due to their complexity. DC2 performed especially well in zinc die-casting. FlexLink's relationship with DC4 was not important in the same way as its relationship with DC2, but DC4's recent technological expansion had created various opportunities for further exploitation of DC4's resources for FlexLink. However, FlexLink's relationship with DC3 did not seem as promising to FlexLink as the other two relationships. There were only 10 items left in the relationship, and therefore, FlexLink decided to end the relationship with DC3 and consolidate its operations with the operations of its other suppliers. This consolidation was based on increasing the similarity of activities each supplier undertakes. The production of products that required zinc die-casting operations were transitioned to DC2, the manufacturing of products that could possibly be manufactured in China were moved to DC1, and the rest were moved to DC4. Economies of scale and scope were an important outcome of this development. With this development, not only DC1, DC2, and DC4 got to utilize their resources better due to increased consolidation of similar activities, but FlexLink also gained the opportunity to rationalize its supplier base and maintain only those relationships that had sufficient scale (see Figure 5-7).



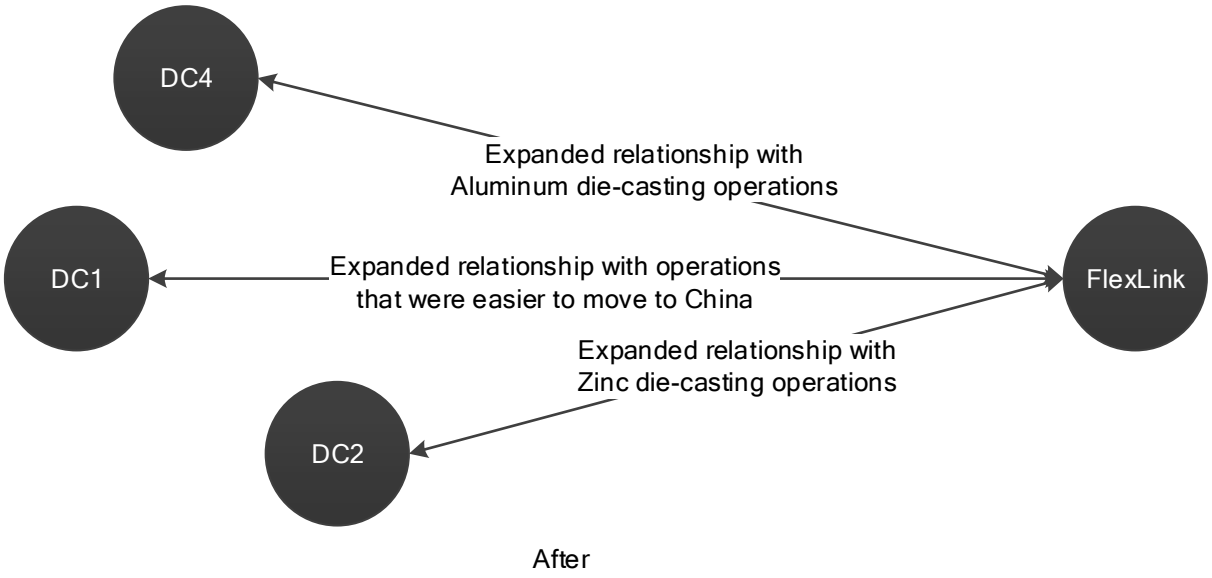


Figure 5-7: Ending one relationship and consolidating other relationships based on activity similarities

Between 2009 and 2013, with DC1 gaining more importance in FlexLink's supply network, both FlexLink and DC1 made various attempts in developing their relationship. Those developments in many cases involved connecting with other relationships. For example, the process of producing phone brackets included various production activities undertaken by DC1, IM3, NB1, and a painting sub-supplier. The components were all sent to FlexLink for assembly and then dispatched to its international distribution center. DC1 saw an opportunity in that process; it took the initiative and asked FlexLink for the assembly activity as well. With this development, DC1 bought

components from IM3 and NB1, and assembled the components together with the components manufactured in-house and painted by a sub-supplier. This brought economies of integration, primarily because DC1 became responsible for coordinating all of those activities.

Before the change, FlexLink had to coordinate its assembly activities with the production activities of DC1, IM3, and NB1; in addition, DC1 had to coordinate its manufacturing activities with the painting activity of the sub-supplier. FlexLink used to purchase the items from IM3 and NB1 in large batches and had to store them until receipt of the items from DC1. The reason for this was that the component manufactured by DC1 was the main component in the phone bracket, and FlexLink did not buy those in batches as large as the components from IM3 and NB1. When the coordination of all of those activities was assigned to DC1, FlexLink could expect better coordination of activities in the new scenario because it was easier for DC1 to coordinate operations schedules with regard to its own internal circumstances and communication with IM3 and NB1. The main advantage for FlexLink was that it had no need to get involved in the day-to-day coordination of those activities; this was advantageous because FlexLink's relationship with DC1 was developed to the point where FlexLink believed that DC1 was capable of accepting this responsibility. DC1 had a large assembly desk that was used for various products that it sold to other customers. With this development, FlexLink also economized on scale and scope by accessing existing DC1 resources in the assembly line.

The more central role that DC1 gained in FlexLink's supply network created new opportunities for FlexLink. One of those opportunities emerged in 2012, when the paints on the products manufactured by DC1 became problematic. Through DC1, FlexLink managed to get connected with its painting sub-supplier, and discussed the problem with DC1 and the painting sub-supplier. The sub-supplier had relationships with multiple paint suppliers, so it offered alternative paints through those other paint suppliers, and FlexLink adapted the design of the product so that one of the alternatives could be used. This solution, which brought economies of innovation to FlexLink, also represented FlexLink's economizing on scale and scope. Instead of changing the painting sub-supplier, or suggesting an option to the sub-supplier that was new to it, FlexLink decided to accept one of the alternatives offered by the sub-supplier, which the painting sub-supplier already utilized for other customers. The decision to approve one of those alternatives was FlexLink's economizing on scale and scope by increasing the utilization of one of those resources of the supplier. Figure 5-8 illustrates the developments described above.

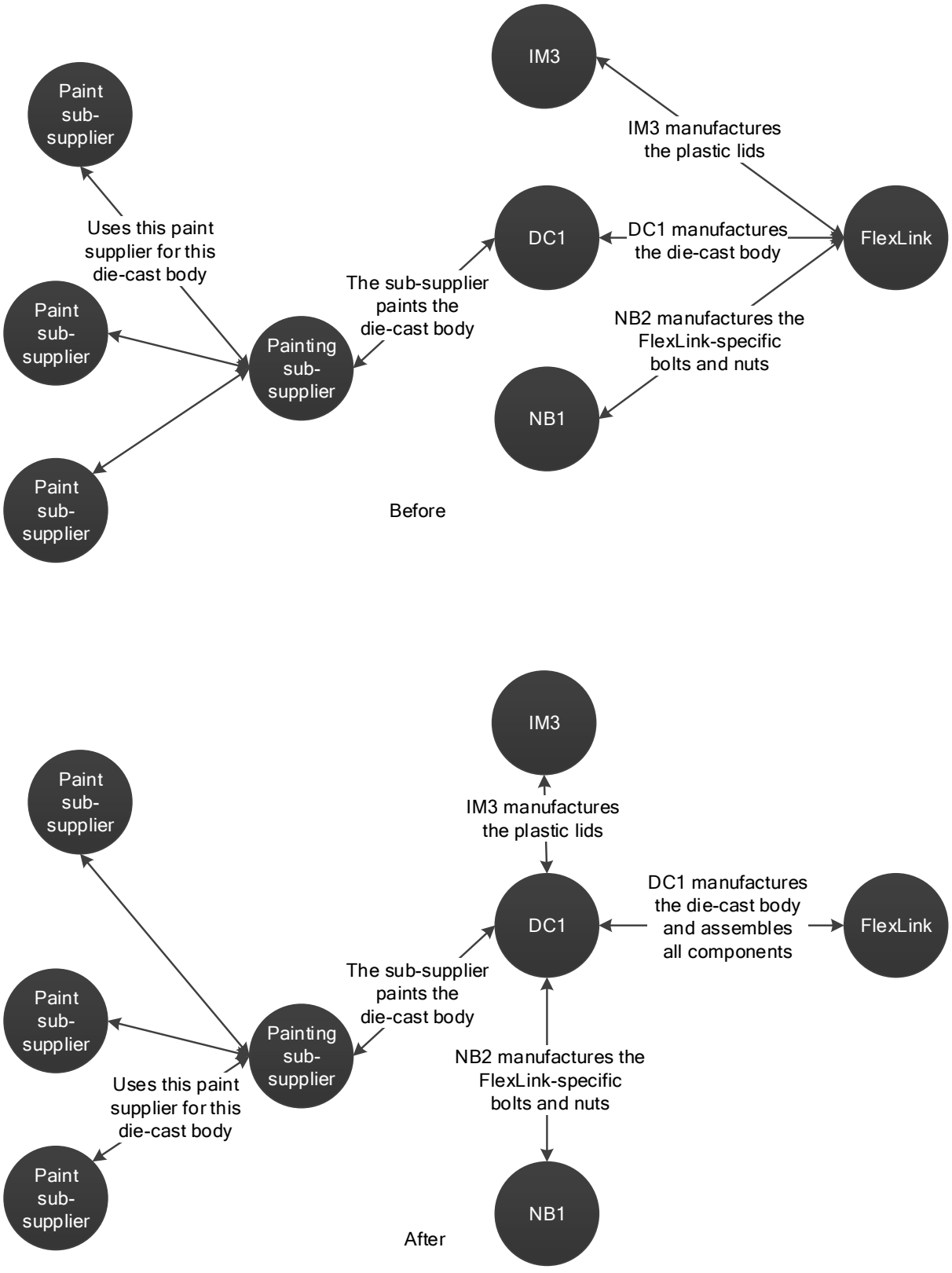


Figure 5-8: DC1 gains a more central role in FlexLink's supply network

Although FlexLink's relationship with DC1 was developed over all those years of cooperation, in many ways the relationship still faced challenges that required more efforts from the two sides for further development. In 2013, the launch of the Athena project revealed one of those challenges. The project involved definition of various new activities, many of which were designed so that they had to be undertaken sequentially by DC1, IM3, FlexLink's assembly unit in Malaysia, and

its international distribution center. The project included various new products and the demand for those products was volatile in the beginning. The problem was that FlexLink's relationships with DC1 and IM3 still lacked proper coordination; DC1 and IM3 used to manufacture based on forecasts, but did not coordinate their production plans with FlexLink. The enormous geographical distance from DC1 and IM3 to FlexLink's international distribution center in Europe expanded lead times and created more difficulties with joint planning of operations between FlexLink and the Chinese suppliers. The high volatility of demand for the products of the Athena project forced FlexLink to use emergency air freight deliveries on various occasions. Those deliveries were expensive, and could not be considered a long-term solution to the problem.

From the beginning, FlexLink's sourcing unit in China was intended to support the suppliers technically and facilitate cooperation between FlexLink and the suppliers in China for problem-solving and new product development, but this unit had not managed to enable better integration of the operational and inventory plans of the suppliers and FlexLink. The lack of economies of integration in that situation manifested itself in sizable, extra unnecessary costs of emergency deliveries that could have been avoided if FlexLink had prioritized coordination of sequential activities through its China Sourcing unit.

5.3 DEVELOPMENTS IN FLEXLINK'S MACHINING AND STAMPING TECHNOLOGY AREA

The third group of major changes analyzed in this period relates to the part of FlexLink's supply network that is focused on machining operations. In the period from 2004 to 2009, when FlexLink reduced its business with MS1 by 95%, the continuation of its relationship with MS1 began to seem economically unfeasible. Therefore, FlexLink made an attempt to rationalize its supplier base by terminating its contract with MS1 and consolidating the remaining business volumes in its other supplier relationships. Viewing the relationship as a resource, FlexLink's decision to terminate this relationship can be understood as its attempt to abandon using a resource that is not utilized to a satisfactory extent, and does not have the potential to be improved in that sense. Hence, the termination of this relationship by FlexLink can be analyzed as an attempt to economize on scale and scope in its supply network. In addition, other machining suppliers of FlexLink became responsible for more activities that have similarities in the use of resources with their own existing activities. The rationalization of the supplier base was therefore enabled by exploiting similarities among activities, mainly through arranging them so that they are undertaken using the same set of resources. Furthermore, this change enabled better utilization of the resources of the suppliers that became responsible for the additional business volumes. In this example, FlexLink's termination of a relationship led to economizing on scale and scope.

The production of the items related to the reduced business volumes between FlexLink and MS1 in Sweden was moved to MS4 in China. Those items were various types of pins, which are specific items and comprise high business volumes. The move of production between the suppliers was originally motivated by the vast cost advantages that production of such products in China could bring to FlexLink. By using an existing relationship (FlexLink–MS4) and taking advantage of the fact that MS4 planned to open a factory in Shanghai, FlexLink economized on scale and scope. This development helped assure MS4 that investing in production facilities for the pins business would pay off, because various pin production activities (with high similarity) would be added to MS4's activity structure. However, in regard to FlexLink's relationship with MS1, this development meant drastically lowering the utilization of MS1's production facilities used for

pins, by vastly reducing the number of activities with high similarity; in other words, losing economies of scale and scope due to reducing business volumes by 95%.

The pins business boosted the relationship between FlexLink and MS4. The joint development of the pins took place in 2006, at the same time as the establishment and start-up of MS4's factory in China. This development required FlexLink engineers and managers from Sweden and China, and MS4's engineers and managers to interact, learn from each other, and use each other's capabilities to get the production of the pins started. Hence, this process of development of pins can be regarded as a co-evolution of FlexLink and MS4. This is especially true because this development would play an important role in the establishment of MS4's factory in China and the efforts of all actors involved in exploring the versatility of MS4's resources in the new factory. Hence, economizing on innovation can be viewed as a driving force for the parties involved in this change.

In 2007, MS4 began the mass production of pins. Besides economizing on scale and scope due to the mass production and high volume utilization of MS4's resources, the two firms also economized on integration. Interactions between the two firms were reduced to only routine call-offs between FlexLink's China Sourcing unit and MS4, with certain individuals maintaining contact for coordinating call-offs. This level of jointness of the actors on both sides of this relationship became grounds for achieving economies of integration. FlexLink kept coordinating its inventory levels and assembly activities with MS4's pin production, stocking, and transportation activities (all complementary with FlexLink's assembly activities in Europe). MS4's acceptance of responsibility for transportation, warehousing, and distribution for the pins business made this coordination even more important. MS4's production and logistical activities had to be coordinated with complementary activities undertaken by FlexLink, IM2, and IM4. Hence, through this change FlexLink economized on integration in its relationship with MS4, by connecting that relationship to the FlexLink–IM2 and FlexLink–IM4 relationships.

Besides the pins, during this period FlexLink decided to move the production of shafts from MS8 to MS4. This resulted in expansion of the FlexLink–MS4 relationship in terms of resource utilization and undertaking of more activities with similarities – therefore, it can be characterized as economizing on scale and scope. This is especially true because production of shafts and pins is relatively similar in terms of the machinery, knowledge, and expertise needed.

In addition, FlexLink and MS4 had a higher jointness compared to FlexLink and MS8. One reason for this was MS8's problems with exporting the shafts to the Waigaoqiao industrial area, where FlexLink has assembly facilities. With MS4 being in the same industrial area, this problem and other proximity-related issues were solved. The importance of this issue lies in the sequentiality of the activities of shaft production and transportation, and their assembly into systems. In order to be able to coordinate and perform those activities, FlexLink and MS8 needed to avoid the complexities of dealing with customs and distance. Hence, through this change FlexLink economized on integration, which enabled it to undertake those complementary activities in a more coordinated way with MS4.

Figure 5-9 illustrates the developments in the FlexLink–MS4 relationship in relation to FlexLink's relationships with MS1, MS8, IM2, and IM4 between 2004 and 2009.

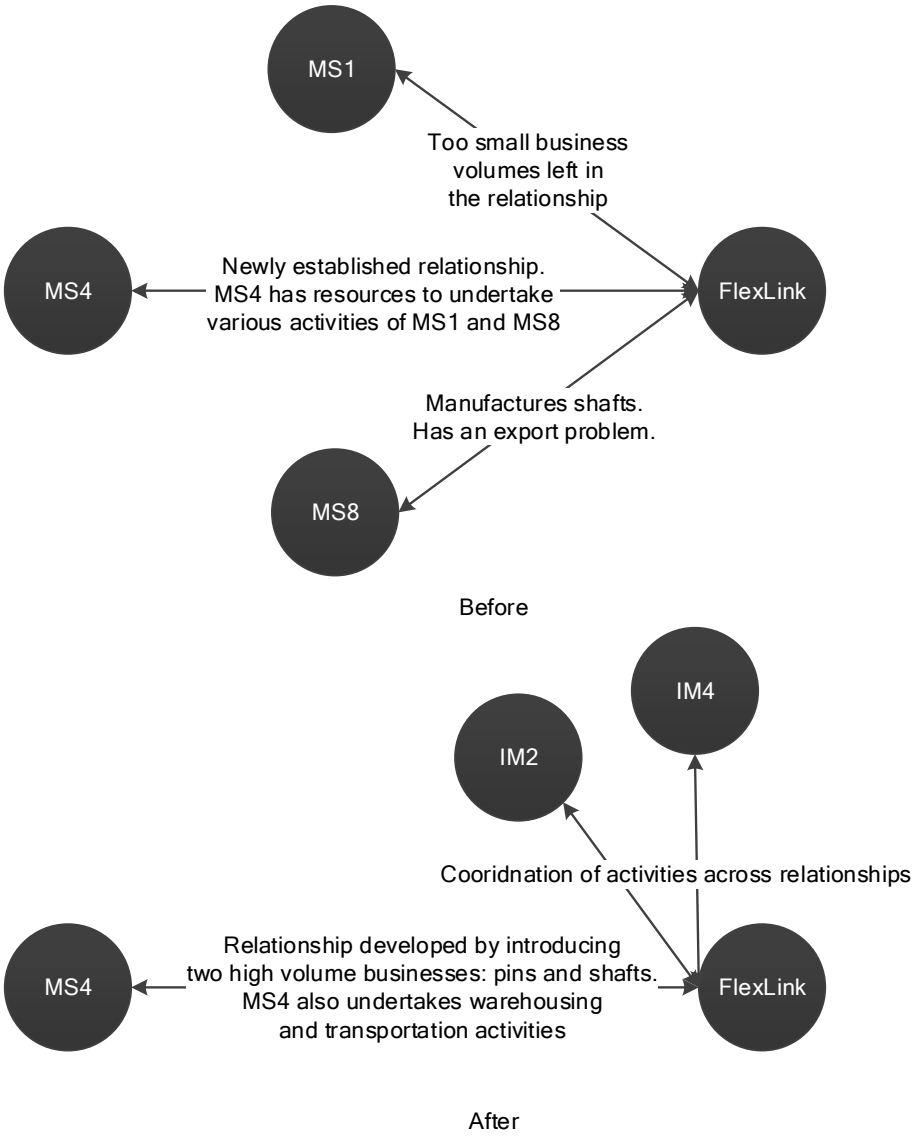


Figure 5-9: Developments in FlexLink's relationship with MS4 between 2004 and 2009

Another one of the important machining suppliers of FlexLink is MS3 in China. The predecessor of MS3 in FlexLink's supply network was MS2 in Europe. During this period, FlexLink decided to move approximately 75% of its business volumes with MS2 to MS3 for cost advantages. For MS2, this change meant a major drop in the importance of FlexLink to them. The actors in the two firms started to grow apart, and coordination of activities dropped. Because FlexLink no longer had priority in MS2's production and scheduling, the sequentiality of the activities of FlexLink and MS2 was not dealt with efficiently anymore. Hence, FlexLink's major move of activities from MS2 to MS3, which led to MS2's deprioritizing of FlexLink, made it more difficult for FlexLink and MS2 to achieve economies of integration in their relationship. Besides, MS2 stopped providing technical support for product development, as well as help with problem-solving for design or production. This reduced the interactions between the actors in the two firms to a great extent, and almost ended the co-evolution of the two actors entirely. No new combination potentials of MS2's or FlexLink's resources were explored in relation to one another, and a large share of previous resource combinations between the two was stopped, resulting in ever-shrinking possibilities for the two firms to economize on integration in relation to each other.

The other side of this coin was FlexLink's establishment and expansion of its relationship with MS3. Over time, multiple new products were continually added to the relationship, and business volumes expanded. The two actors co-evolved through new product development; engineers of the two firms cooperated on many occasions to solve production problems and to design the products in a way suitable for production, and FlexLink provided various technical training and support with tooling to MS3. This enabled the two firms to combine the resources of MS3 with the resources of FlexLink in additional ways, and to explore further combination potentials of those resources. This became a means for FlexLink and MS3 to economize on innovation in their relationship. Additionally, the growth of business volumes and the importance of cost efficiency for both parties led to a better utilization of MS3's resources due to adding multiple new activities to MS3's activity structure, which shared similarities with a lot of MS3's existing activities. Hence, this change can also be described as economizing on scale and scope.

FlexLink's economizing on innovation in the relationship with MS3 has been achieved through exchange of knowledge in the form of training. FlexLink's engineers in the China Sourcing unit have personal contacts with MS3 engineers, and on various occasions have been able to help them solve technical problems with its production of FlexLink products. In addition, FlexLink's engineers have on some occasions provided technical training for MS3 engineers. Such training programs relate actors to each other and create opportunities for better exploration of resource versatilities, because when FlexLink shares its technical knowledge with MS3, MS3 can be expected to utilize its resources more efficiently in relation to FlexLink. New combination and modification potentials may be revealed during such training, and the engineers in the two firms may develop new resource combinations.

During the development of FlexLink's relationship with MS3, MS3 found a supplier (ST1) for surface treatment of some of FlexLink's products. This gave FlexLink the opportunity to offer products with the nitrocarburizing surface treatment produced in China. The establishment of the relationship between MS3 and ST1 took place at the beginning of the FlexLink–MS3 relationship, when the latter two firms were collaborating on developing the first set of their joint products. As early as the beginning of the MS3–ST1 relationship, intense interactions took place between the three parties (MS3, ST1, and FlexLink) to combine the machining-related resources of MS3 with the nitrocarburizing resources of ST1 and the engineering and design-related resources of FlexLink. These interactions were necessary because the design of the products, their machining, and their surface treatment all had to fit each other and lead to the functionality expected for the product. This exploration of the combination potentials of the resources of MS3, ST1, and FlexLink, through interactions of various actors on different organizational levels, was in fact economizing on innovation.

Another instance of FlexLink's economizing on innovation in its relationship with MS3 was the solution to the problem with the flatness of steel-top plates. The problem was discovered by IM2 when the steel-top plates were sent as components to IM2 for assembly into FlexLink's products. FlexLink's solution was to use a quality inspection tool in the process of manufacturing the steel-top plates. FlexLink and MS3 invested in developing and adapting resources to solve the problem; FlexLink designed the tool and MS3 manufactured it. IM2 was responsible for the quality of the product as a whole, but due to that faulty component, IM2 could not deliver the quality promised. While the entire shipment was not problematic, IM2 did not have the resources to perform the

quality check on every item in the shipment. Therefore, the whole shipment was returned to MS3, and MS3 fixed the flatness issue with the help of the quality inspection tool. Hence, through further investments in the adaptation of those resources, FlexLink and MS3 economized on innovation in their relationship.

At the same time, ST1 had recently spun off from the public (military) sector, and was seeking opportunities to establish itself in the private sector. ST1's relationship with MS3 was a change in that direction. In other words, the surface treatment activities that ST1 added to its activity structure for FlexLink's products have similarities with the other activities of ST1 in the use of resources related to the nitrocarburizing technology, leading to better utilization of those resources through exploring their modification potentials. This shows ST1's attempts at economizing on scale and scope by getting involved in this relationship.

After the products were developed, over several years the interactions between the three parties changed to more coordination-related interaction. MS3 became responsible for coordinating the activities undertaken before surface treatment and the exchange of products with ST1, as well as the final delivery to FlexLink. Therefore, MS3's efforts in connecting the activities of the three actors over time increased the jointness among them, because various complementary activities with high sequentiality had to be coordinated between the three actors. When FlexLink issued a purchase order to MS3, MS3 created plans for its internal operations and coordinated deadlines with ST1 to be able to deliver the products on time to FlexLink. Various ongoing interactions between FlexLink and MS3 concerning logistical matters helped MS3 in its planning of such activities. Hence, MS3 is found here to be economizing on integration.

Alongside the development of the relationship between FlexLink and MS3, another development provides a good illustration of economizing on integration in FlexLink's supply network – MS3's investment in sandblasting machinery in order to bring the sandblasting operations in-house. This avoided unnecessary activities and exchanges of products between MS3 and the sandblasting supplier, which included inspection, transportation, and short-term storage activities. New investments by MS3 in the relationship increased jointness between the actors on both sides of the FlexLink–MS3 relationship. In addition, this development led to modification of the activity structure by eliminating a number of unnecessary activities, and arranging the activities to be undertaken in a more integrated way. The shorter lead times and the better coordination opportunities that were made possible by this development show that this development can be analyzed as MS3 economizing on integration (see Figure 5-10).

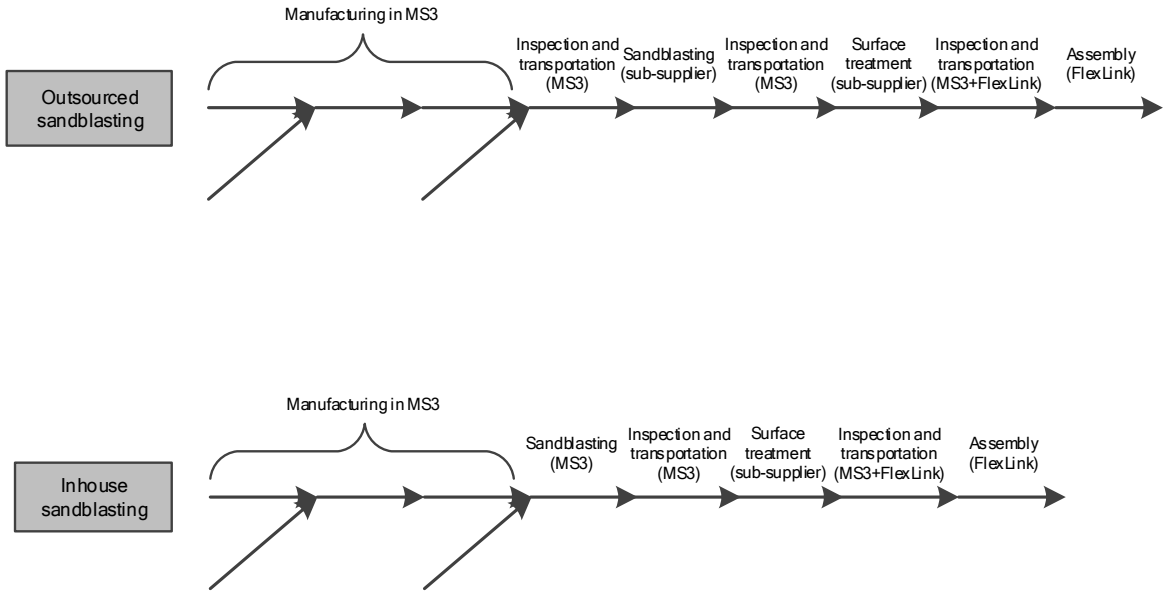


Figure 5-10: MS3 economizing on integration

The relationship between FlexLink and MS4 experienced various ups and downs. An important highlight of that relationship was the handling of the pins business. In 2007, MS4 became responsible for supplying the pins to FlexLink, but instead of investing in acquiring resources needed for this production, MS4 decided to outsource the production of pins to a sub-supplier and did not communicate this decision to FlexLink. However, this issue did not surface as a serious problem until 2011, when FlexLink and MS4 got into heated discussions on exchange-rate fluctuation compensation. The discussions severely damaged the atmosphere of the relationship, making FlexLink reconsider its sourcing decisions regarding pins and shafts. For the pins business, FlexLink realized that having MS4 as a middleman primarily meant additional costs without any added value. Besides, MS4's arrangements with the sub-supplier had made it difficult for FlexLink to interact and develop the product in collaboration with the supplier of the pins. This was mainly due to the fact that FlexLink did not have any contact with the sub-supplier, and every development in resource combinations of FlexLink and the sub-supplier had to go through MS4. This made it difficult for FlexLink to utilize the supplier for opportunities for new product development and problem-solving. Therefore, in 2011, these difficulties for the co-evolution and exploration of resource combination potentials of FlexLink and the sub-supplier became the main reasons for FlexLink's decision to establish a relationship with MS7 in order to replace MS4 and its sub-supplier for pin production.

The establishment of the relationship between FlexLink and MS7 included a lot of interaction among the actors on both sides of the relationship on different engineering and management levels. The objective of those interactions was to develop and set up the production of pins, and they involved FlexLink's design engineers and MS7's production engineers working together to exchange samples and designs until mass production could be started. As a result, FlexLink and MS7 co-evolved so that MS7 would gradually manage to deliver what FlexLink wants and FlexLink would gradually adapts its design to arrive at what could be manufactured and still be satisfactory for FlexLink.

The versatility of the resources of FlexLink was further explored by combining them with the new resources MS7 was to offer. For example, for surface treatment, FlexLink used to combine its designs with MS4's electronic polish machinery. However, in the new relationship, FlexLink had to change its designs to cope with the vibration polish that MS7 offered. Combining resources of FlexLink with new resources had implications for the resources of FlexLink. Given the limited opportunities for resource-combining that were presented to FlexLink in its previous deals with MS4 (due to MS4's position as a middleman), this was a good opportunity, and FlexLink took advantage of it and in this way economized on innovation in its relationship with MS7.

The relationship with MS7 enabled FlexLink to acquire the products for a lower price than in its former deals with MS4. This was possible because MS7 had the resources required for the manufacturing of FlexLink's pins, and the addition of FlexLink's activities enabled better utilization of the capacity of those resources. MS7's activities related to pin production for FlexLink had high similarities with multiple other activities of MS7, regarding its utilization of resources. However, those FlexLink-related activities had few similarities with MS4's activities, and MS4 did not have the resources to undertake them. Hence, MS4 had to outsource those activities, which incurred additional costs. With this change from MS4 to MS7, FlexLink managed to economize on scale and scope by giving the job to a supplier that can better exploit similarity of those activities with its own, and thus reduce costs.

On the other hand, this development meant fewer opportunities to economize on scale and scope in the relationship between FlexLink and MS4. The reason for this was that pins were bought by FlexLink in high volumes, and were used in almost every FlexLink-produced system. This development narrowed the scope of the FlexLink-MS4 relationship to the shafts business only, and considerably reduced the scale in that relationship as well. However, before finding MS7, FlexLink decided to maintain the relationship with MS4 until a new replacement supplier was found. The activities that MS4's sub-supplier performed for FlexLink had similarities in their use of resources with the other activities that the sub-supplier undertook, and thus the sub-supplier managed to increase its resource capacity utilization by undertaking FlexLink's activities. Maintaining those relationships (with MS4 and the sub-supplier) was motivated by the possibility that FlexLink could continue exploiting those similarities – even though the deal would only last for a limited time. This was at the cost of around 10% price increase for the pins, which FlexLink agreed to due to the economies of scale and scope of this limited-duration deal.

FlexLink used the help of MS4 to smoothly transfer production to MS7. For example, the raw materials that MS7 previously used for FlexLink production had been approved in a deliberate process by FlexLink. MS4, by selling its excess amount of that raw material to MS7, made it easier for FlexLink to initiate the relationship with MS7 and avoid long delays due to the initial raw-material approval process. Besides, by using the previously used raw material in sample production at MS7, FlexLink and MS7 could focus their efforts in solving production problems and rule out the raw material quality as a cause of any problems. MS4's taking this extra step was partly motivated by FlexLink's collaborative behavior – before the transition to MS7 – in solving the currency-compensation problem and price-increase situation with MS4. MS4 facilitated the co-evolution of FlexLink and MS7, and made it possible for FlexLink and MS7 to combine their resources (MS4's production facilities and FlexLink's design and sample testing resources) with MS4's raw material, facilitating the exploration of further combination potentials of MS7's and

FlexLink's resources. By influencing and making these arrangements, using its relationship with MS4, FlexLink managed to economize on innovation in its relationship with MS7.

Furthermore, from a logistical viewpoint, the new arrangements created new opportunities and challenges for FlexLink. When MS4 was responsible for FlexLink's pins, it was MS4 that had the full responsibility to deliver the pins to IM2 and IM4, FlexLink's suppliers in Europe that needed the pins for their assembly operations. However, after the establishment of the relationship with MS7, FlexLink became responsible for the availability of the products to IM2 and IM4 and had a more important coordination role. Production was streamlined by removing the middleman (MS4) and connecting directly with the manufacturer of the pins. For the pins business, the jointness of MS7 and FlexLink is higher than that of MS4 and FlexLink, especially due to the fact that FlexLink is directly involved in setting up and maintaining the production of pins by MS7. This higher jointness made coordination of those activities easier, because it gave FlexLink the option to contact MS7 directly and coordinate schedules and plans with them more easily – an important feature that FlexLink's relationship with MS4 could not have in pin production. The change from MS4 to MS7 – and FlexLink becoming responsible for supplying components to some of its suppliers – can be understood as FlexLink's economizing on integration. Figure 5-11 illustrates the developments discussed above.

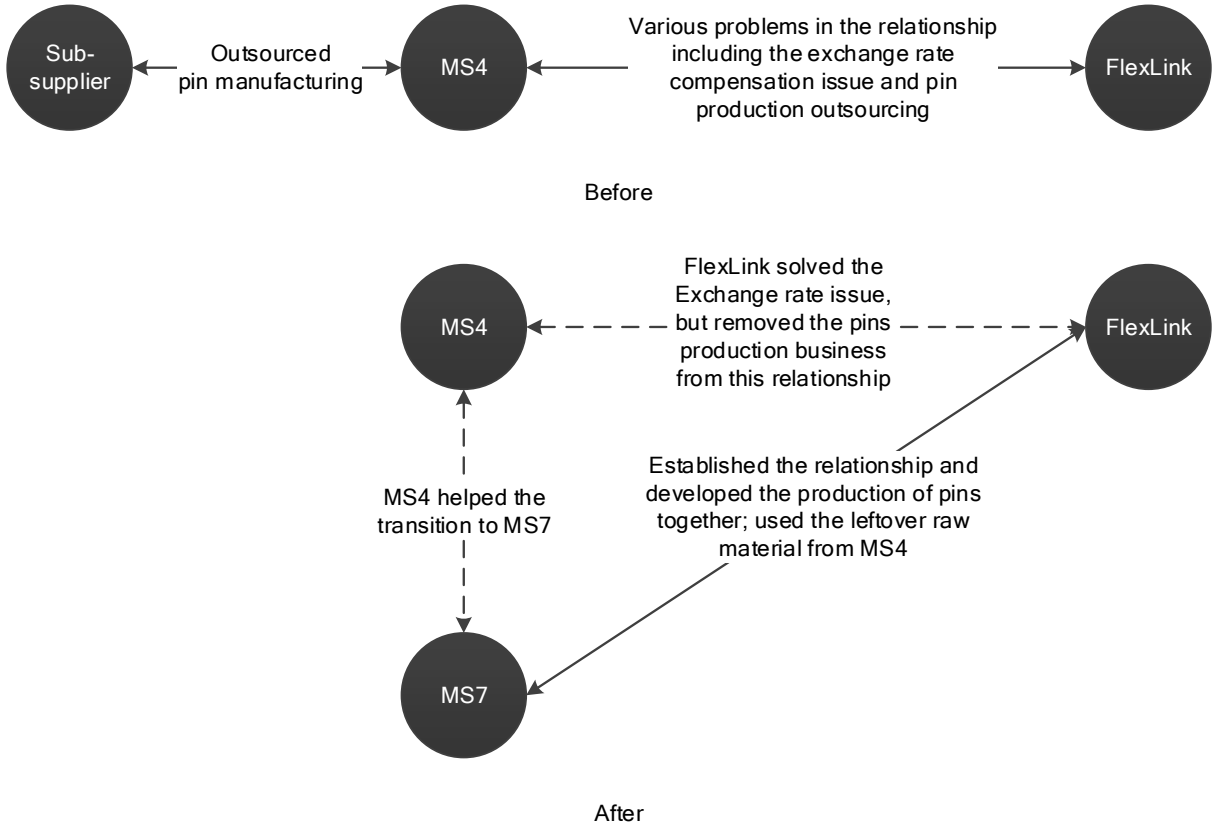


Figure 5-11: The developments in FlexLink's supply network regarding the production of pins

5.4 DEVELOPMENTS IN FLEXLINK'S STAINLESS-STEEL DIE-CASTING TECHNOLOGY AREA

Before 2004, FlexLink had decided to offer stainless-steel versions of some of its products, and found SS3 for that purpose. FlexLink's deals with SS3 were limited to catalogue items, which were branded with FlexLink's logo and sold to FlexLink. Economies of scale and scope were the

main benefits in the FlexLink–SS3 relationship; with this relationship FlexLink gained the ability to offer stainless-steel products by accessing the resources of SS3. By purchasing items from SS3's catalogue, FlexLink increased the scale of production of those items by SS3. This gives SS3 the opportunity to better utilize its production resources, as they share the machinery for the same products with other customers. This has two aspects. First, by choosing to source catalogue items from SS3, FlexLink adds activities that are similar in their use of resources (resources that SS3 uses for manufacturing those catalogue items) to SS3's existing activities. This increased production of the catalogue items better utilized SS3's resource capacity. Second, the minor customizations required by FlexLink (for example, inserting a logo), expanded the scope of utilization of SS3's manufacturing resources.

However, focusing the FlexLink–SS3 relationship on standardized products yielded limited development opportunities for the two parties in relation to one another. Co-evolution between the two firms was limited, because FlexLink only purchased catalogue items from SS3, and neither made major changes to the products nor introduced new products. The scope of business deals between FlexLink and SS3 in this period was restricted by the fact that the two firms related their actor contexts to each other's only to a limited extent, because purchasing catalogue items did not require intensive interaction between the actors. For the same reason, there were only limited opportunities for exploring further combination potentials of the resources of the two firms, because the resource contexts of the two sides of the dyad were only loosely related to one another, with FlexLink primarily adapting to SS3's resource context.

Later, in 2010, FlexLink undertook the Mirror project. The objective of the project was to create a new and complete set of components for production logistics systems to be used in the pharmaceutical and food industries. Stainless-steel die-casting was central to that project. As a part of that project, FlexLink expanded its relationship with SS3 by choosing new products from SS3's catalogue, and thus economized on scale and scope in that relationship.

Additionally, FlexLink needed to access new resources that would enable it to offer products designed by FlexLink. SS1, SS2, and SS4 are the most important suppliers possessing stainless-steel die-casting technology with which FlexLink established relationships to access such resources. FlexLink also economized on innovation in its relationship with LC1[16] by accessing new resources of LC1 to manufacture laser-cut stainless-steel products. This involved exploring versatilities of LC1's resources and combining those resources with the resources of FlexLink during the new-product development process. Maintaining the LC1 relationship was an advantage for FlexLink, because, for a set of products FlexLink engineers wanted to design, the relationship with LC1 created an opportunity through resource adaptations; the engineers designed the products specifically so that they could be manufactured using LC1's resources. However, the products designed for the relationships with SS2 and SS4 were different; those relationships were established by FlexLink based on the technical requirements of the products under development. The large-sized products required a supplier with such capabilities, and therefore SS4 was found as a promising supplier for them. SS2's experience with stainless-steel die-casting was also needed for the more complicated products FlexLink engineers were designing.

[16] A previous supplier that FlexLink used for laser-cutting and bending.

Additionally, the developments in FlexLink's relationship with SS1 (and some relationships connected to it) featured a number of important highlights. In 2010, China sourcing had already proven to be a promising investment for FlexLink, and it was willing to explore new sourcing opportunities in China. At the same time, the Mirror project included various products characterized by labor-intensive production activities; FlexLink found it appropriate to assign these products to a supplier in China. FlexLink's search for a new supplier ended up in two final candidates; one was experienced in working with Western companies but expensive, and the other (SS1) was a small business with limited export experience, but offered significantly lower pricing for the initial products.

FlexLink's choice of SS1 over the other supplier was motivated not only by the low direct purchasing costs (in other words, the offered price), but also by the cooperation potential it saw in SS1. FlexLink expected that a relationship with the other supplier might be less cooperative, because their relationship might turn up to be over-formalized. FlexLink expected SS1 to be more cooperative and willing to invest in helping FlexLink develop the new products. FlexLink did not have experience in stainless-steel die-casting technology; it needed to work closely with its suppliers and jointly develop those products. Hence, in addition to economizing on scale and scope, FlexLink's establishment of a relationship with SS1 was an attempt to economize on innovation.

Economies of innovation were achieved in the FlexLink–SS1 relationship through various interactions between the engineers on both sides of the relationship for the development of many new products. Those interactions included extensive involvement by FlexLink engineers, supervising production, helping SS1 solve technical problems, and discussing various technical issues for the design of the new stainless-steel products. Over time, SS1 demonstrated a major interest in the relationship, flexibility, and willingness to cooperate, and those were important components in FlexLink's process of economizing on innovation in that relationship. In 2011, the reduced prices of the stainless-steel products caused FlexLink to forecast high sales for 2012, and it issued large purchase orders to SS1 accordingly. However, the actual sales in 2012 were well short of FlexLink's expectations, and FlexLink and SS1 were left with a large deviation between production and sales of the stainless-steel components. At that point, a compromise was agreed upon to save FlexLink major expenses. SS1 agreed to hold inventories and reduce manufacturing of the components until the problem was solved. Here, FlexLink managed to economize on integration; the close relationship between FlexLink and SS1 resulted in high flexibility from SS1 in adjusting the undertaking of its manufacturing activities to FlexLink's inventory plans.

Up until 2013, FlexLink and SS1 had developed various new products together as a result of new product development projects, such as the Honeybee project. The various adaptations of the resources across this relationship have resulted in the co-evolution of actors on both sides of the relationship. FlexLink now has more experience with the stainless-steel die-casting production technology and can more efficiently design products for manufacture by SS1. Likewise, SS1 has evolved into a more professional supplier for FlexLink; according to FlexLink's quality manager, SS1's manufacturing process has become faster with a larger technological scope, and the company has developed various new resources and a larger customer base. FlexLink utilizes a large portion of those new resources of SS1 and shares them with other customers, resulting both in economies of innovation and economies of scale and scope.

In the beginning of the relationship, SS1 did not have an export license. Therefore, it used an import/export agent to sell its products to FlexLink, and such settings had made it difficult to achieve economies of integration. However, by 2013, SS1 had obtained its import/export license and, using that, even managed to help FlexLink economize on integration in its relationship with AG1. As mentioned above, FlexLink established a relationship with AG1 in 2013 in order to manufacture assembly guns. Those products were previously manufactured by a supplier in Europe, but to lower the price, and FlexLink needed to move them to a supplier in China. AG1 showed that it could deliver the products with satisfactory quality, but it did not have an export license. FlexLink connected SS1 and AG1 in order to solve the problem; SS1 was assigned the task of buying the products from AG1 and exporting them to Europe for FlexLink, in exchange for a margin. This can be classified as FlexLink's economizing on integration; it managed to develop the relationship by connecting it to another relationship. Buying through SS1 was a more suitable arrangement than working with AG1 via an import/export agent, because the FlexLink–SS1 relationship was already established and could bring lower costs and better opportunities for activity coordination.

Figure 5-12 illustrates the developments in FlexLink's supply network in the stainless-steel die-casting technology area, and a few other related relationships.

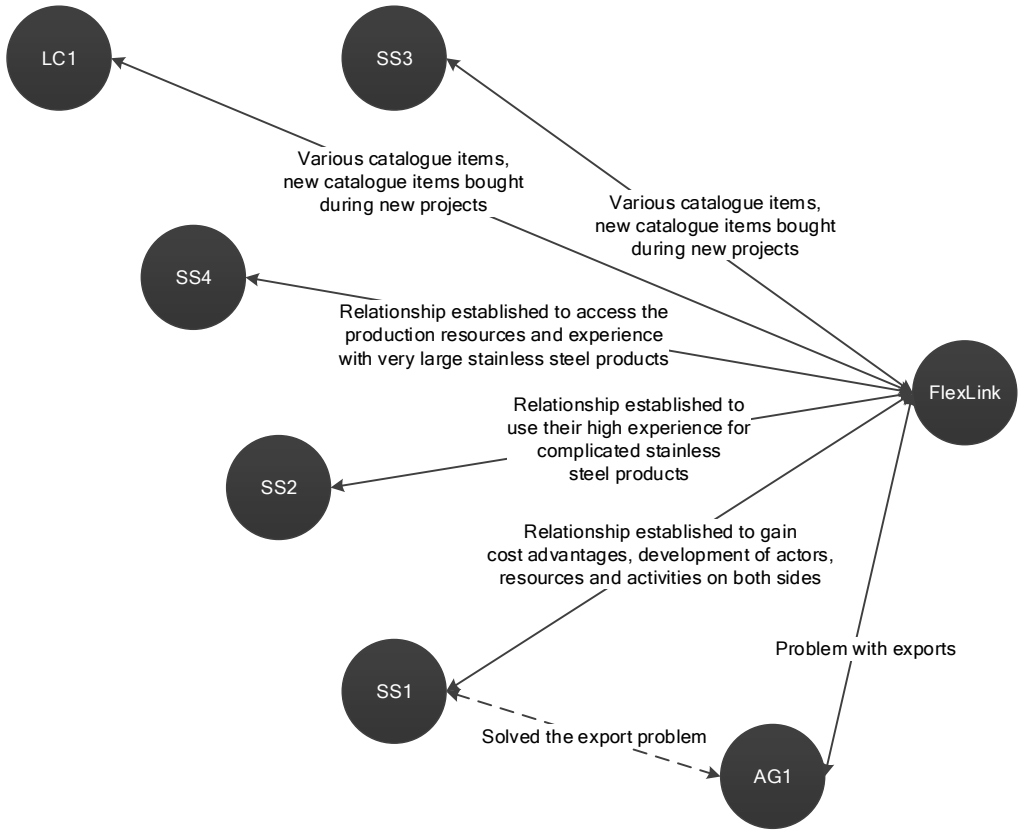


Figure 5-12: Developments in FlexLink's stainless-steel die-casting technology

6 Dimensions of economizing on supply network development

The main components of the framework for analysis of economizing in supply networks are captured by the three research questions in section 2.5. Each research question was designed to cover one type of economization on supply network development. The types of economization are based on the theoretical assumptions in the industrial networks approach. In the following sections, the three research questions are discussed by elaborating on the dimensions of each type of economizing for a firm considering supply network development. This is to understand the composition of the dimensions for each of the three pairs of concepts suggested in the framework for analysis of supply network development. The case analysis in chapter 5 is the basis for the discussion in this chapter, in which the findings of the analysis in chapter 5 are scrutinized in order to conceptualize economizing by identifying dimensions that can help analyzing supply network development in terms of economizing.

In the problem discussion, the analysis to approach the research questions was motivated with a pair-wise logic (see Figure 2-2 on page 29). Each development is suggested to be analytically divided into changes that are limited to two network layers. Each research question is set out to understand one type of economizing as the logic behind changes in a pair of network layers. The discussion below utilizes that logic to identify three dimensions that conceptualize economizing as a tool for analyzing a firm's taking part in developments in its supply network. Focus, direction, and scope are posited as the three dimensions that together form a conceptualization for analyzing each change in terms of how the change makes economic sense for the firm.

Table 6-1 shows that the direction of each change in a supply network depends on what is being developed (the focus), whether the change concerns a certain relationship and/or connections among a number of relationships (the scope), and the type of economic logic behind it. An example is provided here to clarify what the table means. When a change is analyzed as having an adjustment to a particular set of activities in the network as its focus, the change has a relational scope if a particular activity link in a particular relationship is being adjusted. If a particular pattern of activities that connect multiple relationships is being adjusted, the scope of the change would be identified as inter-relational. The economic logic driving the change specifies which direction the change takes. If the adjustment of activities is motivated by the economies of scale and scope that it can bring for the firm, the activities are adjusted in the direction of improved utilization of particular resources of either (or both) of the parties involved. Alternatively, if the adjustment of activities is driven by a logic based on economies of integration, the activities are adjusted so that the jointness of particular actors is improved. This conceptualization of a firm's economizing on supply network development is elaborated with detailed examples in the three sections below, where the three research questions are discussed.

Table 6-1: Directions when economizing in supply networks

Focus (scope) / Types of economic logic	Adjusting activities (links/patterns)	Adapting resources (ties/constellations)	Relating actors (bonds/webs)
Economizing on scale and scope	Utilization of resources	Undertaking of similar activities	-
Economizing on integration	Jointness of actors	-	Coordination of sequential activities
Economizing on innovation	-	Co-evolution of actors	Exploration of resource versatilities

6.1 ECONOMIZING ON SCALE AND SCOPE IN A SUPPLY NETWORK

As shown in the case analysis, when developing a supply network through economizing on scale and scope, the buyer exploits the resources of the supplier to undertake an activity, provided that the supplier is able to perform the activity in a "better" way than before. This is because of the supplier's ability to exploit similarity between the focal activity and the other activities the supplier undertakes using its resources. To be "better" is relative with regard to economizing on scale and scope for each situation depending on the circumstances. This may encompass multiple advantages that come with increased scale or scope in utilization of a resource.

First, reduced costs may be expected due to improved utilization of focal resource capacity. The buying firm would not need to invest in or allocate internal resources to the focal activities and can instead have a supplier undertake them, which can use the focal resources with higher scale. This is enabled through the supplier's relationships with its other customers. Through those relationships, the supplier becomes responsible for undertaking activities that have similarities with the activities of the focal buyer. By attracting more of those activities, the supplier has the opportunity to undertake those activities at a lower cost than what could be achieved by each of the buying firms if they were to invest in the required resources internally.

Second, the similarity among such activities over time makes the supplier more specialized in undertaking them. The supplier would gain valuable expertise and knowledge regarding the undertaking of the focal activities that neither of the buying firms could possibly have gained on their own.

Third, increased scale at the supplier can result in more interactive relationships, which can in turn be a reason for the emergence of new opportunities. The buying firm may explore the other resources of the supplier and try to find similarities between its own activities and the activities that utilize those resources. The supplier may use its experience with the focal activities to help improve them or solve a specific problem that one of the buying firms has with these activities. Furthermore, the supplier may invest in upgrading its resources to provide those activities more

efficiently or more effectively; such an investment might not have been worth it if each of the buying firms considered it for individual use.

All in all, economizing on scale and scope is defined as *"to accumulate activities with similarities and to better exploit the resources that those activities utilize."* Economizing on scale and scope, in terms of focus, can be in two forms, adjustments in the activity dimensions and adaptations in the resource dimension. Below, those two forms are presented, describing the other two dimensions (direction and scope) of each form and elaborating with some examples based on the case analysis in chapter 5. Figure 6-1 summarizes the contents of this section.

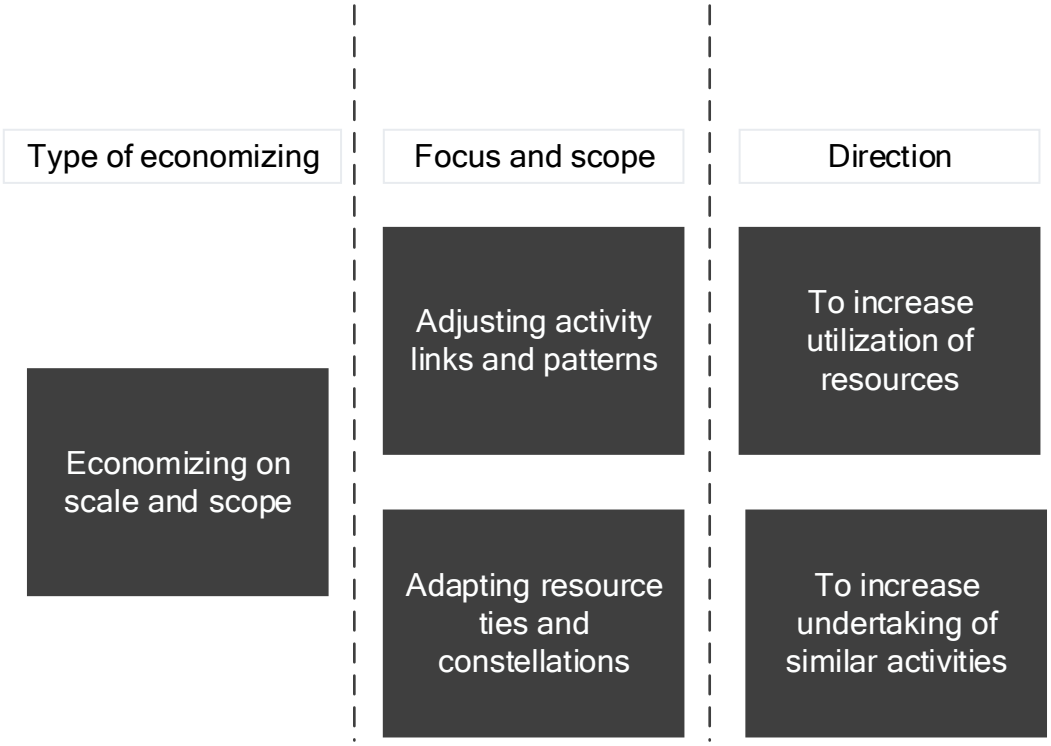


Figure 6-1: Dimensions of economizing on scale and scope on supply network development

6.1.1 ADJUSTING ACTIVITIES FOR IMPROVED UTILIZATION OF RESOURCES

Buying firms access the resources of their suppliers for undertaking their activities. The supplier, in turn, utilizes each of its resources for undertaking activities related to multiple customers. Such activities have similarities with each other, and those similarities enable a resource to be used for some or all of those activities. A firm's economizing on scale and scope in its supply network can be based on adjustment of such activities and how they are related to each other with regard to resource utilization.

The most obvious forms of economizing on scale and scope seem to be the forms where the direction is to increase the utilization of a certain resource. Such developments can in some cases be through increasing indivisibility of the resources in focus. Adjusting activities and their links in this direction means that activities are altered in order to become more similar to each other, so that they can be undertaken using the same set of resources. The context in which a buying firm economizes on scale and scope can be a supplier relationship or wider than that, such as in cases that incorporate multiple connected relationships. Engaging in connected relationships and

developing them for gaining economies of scale and scope would require a different approach than when a single supplier relationship is the entire scope.

Relational activity adjusting for resource utilization

In a supplier relationship, the buying firm can economize on scale and scope by focusing on the extent to which a certain activity is undertaken by the supplier for the buying firm. One instance of this form of economizing was seen in the case where FlexLink ordered one of SS3's catalogue items in order to be able to offer stainless-steel products to its customers. The item was a standardized product with a minor customization for FlexLink's brand. Before FlexLink's deal with SS3, SS3 used to utilize a certain set of its resources to undertake the manufacturing activity related to the product; however, FlexLink's purchase orders increased the extent to which SS3 would undertake that activity. In this way, FlexLink managed to obtain the product without the need to invest in the resources required for manufacturing it, and SS3 managed to increase the utilization of those of its resources that are used for undertaking that manufacturing activity. In fact, the limited volumes of that product that FlexLink needed would not have left any room for economies of scale if it was to invest in the resources required. But through the relationship with SS3, FlexLink managed to add only incremental volumes of the manufacturing activity to the large existing scale of that activity at SS3.

Furthermore, adjusting activities in a relationship towards increased resource utilization can be performed by increasing batch sizes or order sizes. Many examples of this are illustrated in the case, and for that reason FlexLink's overall approach in supplier relationships includes ordering batches that are as large as possible. In some circumstances, increased resource indivisibility enables such benefits. This is the case when the capacity of the resource in focus can be divided into periods of allocation to different activities, between which the resource is subject to a certain amount of downtime. For example, most of the machinery used by the injection-molding suppliers of FlexLink can be utilized for manufacturing a wide range of plastic injection-molded products. However, in order to switch between the manufacturing activities for each product, the molding tool on the machine has to be replaced with the mold required for the new activity. By increasing batch sizes, the time intervals during which the resource can be utilized before having to switch to the next mold can be increased. In this example, the resource is the injection-molding machine, and the result of the change is reducing the downtime of the machine. If the molding tool is assumed as the focal resource, the same result can be expected of this development, but here in terms of the mold being dismounted for less time as well as fewer mounting and dismounting operations. By increasing the total amount ordered, the supplier gets the chance to increase the utilization of the resources needed for the activities it undertakes for the focal buying firm.

This form of economizing on scale and scope can be applied to both standardized resource interfaces and to resource interfaces with a higher degree of customization. In the former case, resource indivisibility does not play a vital role in achieving such benefits, because in a standardized interface economizing on scale and scope primarily requires additional volumes of activities. However, activities undertaken through more customized resource interfaces require additional adaptations, and that, in certain cases, can heighten the importance of reducing the need to switch between activities on a certain resource to economize on scale and scope.

Another way for a buying firm to increase resource utilization and economize on scale and scope in a supplier relationship is to introduce new activities that have similarities with the other activities the supplier undertakes for the buying firm. The goal is to increase the utilization of the resources that the supplier exploits for the focal buying firm. However, the main difference from the previous way of increasing economies of scale and scope is that the prior way involves increasing the scale to which an activity is performed by the supplier, while this way entails expanding the scope of the activities the supplier undertakes for the buying firm. Figure 6-2 summarizes and illustrates this form of economizing on scale and scope.

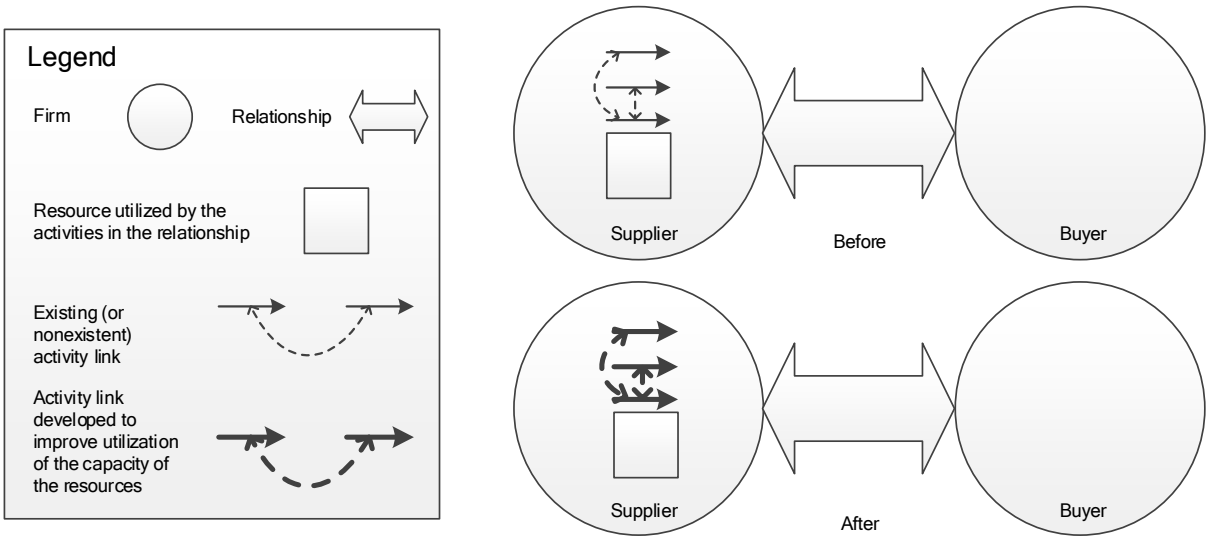


Figure 6-2: Economizing on scale and scope in a supplier relationship by adjusting through activity links

Various examples of this were presented in the case, where FlexLink makes adjustments to activities that a supplier undertakes for FlexLink to increase the utilization of the resources of the suppliers it accesses through those relationships. For example, when expanding sourcing in China, FlexLink gradually introduced new manufacturing activities to its relationship with DC1 and introduced new models of idler ends and drive units. When analyzing which activities could be moved to China, FlexLink assessed whether those activities could be undertaken by use of the resources of DC1. In other words, FlexLink's decision to expand its relationships with DC1 was an attempt to economize on scale and scope in that relationship by adjusting activities so that their similarities could be leveraged – and as a result, the resources of DC1 and the FlexLink-DC1 relationship (considered as a resource) could be better utilized. This was made possible because the new activities that were introduced in the supplier relationships in China were different from the activities it was already undertaking, but subject to higher degree of potential similarity in utilizing the same set of machinery (or within the same relationship, when the relationship is analyzed as a resource).

In the example above, the supplier's utilization of the focal resource was increased by enabling its use for a wider scope of activities that have certain similarities. Although the activities in the example are diverse, and this makes them suitable for FlexLink's purpose of expansion of the product catalogue, economizing on scale and scope in those situations is made possible by relying

on the similarities of those activities. The reason why this way of economizing on scale and scope is highlighted here as compared to the way described above is that although they both result in increased resource utilization, the current way highlights the expansion of the variety of activities undertaken using a resource.

This expansion of the varieties of activities undertaken can be valuable in itself. In the example above, if it is possible for the buyer and the supplier to accommodate the activities related to the new models of the idler ends and drive units in the relationship, they both can benefit. If this is not possible, the supplier would lose the opportunity for additional business and the buying firm would have to invest in a new supplier relationship to undertake those activities (assuming that none of the buying firm's existing suppliers can possibly accommodate the new activities).

Inter-relational activity adjusting for resource utilization

Improved resource utilization can also be achieved by adjusting activities across connected relationships. This can be accomplished when a buying firm takes advantage of the similarity among activities that multiple suppliers undertake (for the focal buying firm or for their other customers), and applies them to a more limited set of resources. The buying firm concentrates the undertaking of activities with similarities to provide them using fewer resources than before. This can be performed in different ways: by relying on those resources of the suppliers that are already being exploited by the focal buying firm, by exploiting new resources of the suppliers that are being utilized for their other customers, by shifting the undertaking of certain activities away from some suppliers to other existing ones, by deciding not to introduce new activities into a certain supplier relationship and instead only expand the relationships with other suppliers, or by other means.

In the FlexLink–DC1 relationship, FlexLink in 2004 increased the volumes of angle brackets ordered from DC1 by abandoning the dual-sourcing approach and making DC1 solely responsible for manufacturing those items. In other words, FlexLink consolidated an activity that was previously undertaken using two sets of resources (DC1's and DC4's) to a single set of resources (DC1's).

In another example from the case, FlexLink in 2011 abandoned its relationship with DC3, and moved the activities that DC3 used to undertake for FlexLink to DC1, DC2, and DC4. This consolidation of activities permitted FlexLink to economize on scale and scope across multiple relationships by adjusting activities in order to have them better utilize certain resources. The focus of this change involved moving activities from DC3's resources to the resources of DC1, DC2 and DC4, adjusting the moved activities so that they could be undertaken by the resources of the three suppliers, and adjusting the links between the moved activities and the other activities of the three suppliers. All three suppliers had the necessary resources to undertake the moved activities, but FlexLink made its choice of "which supplier gets which activity" by taking into consideration "which activity fits which resource with regard to its similarities with the activities already utilize that resource." For example, the manufacturing of items that technology-wise could be manufactured by DC1 was moved to DC1, due to the cost advantages of DC1's operations in China. Regarding the rest of the items, FlexLink moved the manufacturing of the aluminum die-cast items to DC4 and the zinc die-cast items to DC2, because in its relationships with the two suppliers, FlexLink considered DC4 to be a relatively better supplier in aluminum die-casting,

while DC2 was more skilled in zinc die-casting. Besides, FlexLink's relationship with DC4 needed to be improved, and the choice of moving the aluminum die-casting activities to it was also motivated by those activities' high volumes, which could help improve the relationship. FlexLink's economizing on scale and scope on this development was to gain various benefits including evaluating the supplier base to minimize its supply handling costs, to improve its relationships with some of those suppliers through increased volume of business, and to avoid further investments in a supplier relationship that was not functioning satisfactorily.

Another form of economizing on scale and scope concerns searching for and exploiting similarities between the buying firm's activities and activities related to relationships connected to the firm's relationship with a supplier. When doing so, the buying firm would look for opportunities that could provide further economies of scale or scope to its utilization of the resources of a supplier. This includes utilizing an unexploited portion of the capacity of the supplier's resources by finding other resources that the supplier has and currently uses for other customers. If the activities undertaken using those resources have similarities with any other activities that the buyer provides or wants to provide, the supplier can economize on scale and scope by utilizing those (see Figure 6-3).

One way to economize in this way is to examine similarities between the firm's activities and the activities that the supplier undertakes for its other customers. Similarities can be sought among the focal buying firm's existing activities, or new activities can be developed and designed in a way that produces similarities with those activities the supplier undertakes for its other customers. For example, MS4 had been producing customized pins for FlexLink since 2007, but later FlexLink realized that MS4 had heavier duty lathing machines that it utilized to undertake manufacturing activities of larger round products for other customers. Those activities had similarities with activities that were needed for manufacturing FlexLink's shafts by its use of lathing machines. FlexLink took advantage of that opportunity and expanded its relationship with MS4 for the shafts business, adjusting shaft manufacturing activities to increase the utilization of MS4's lathing machines that were then used for manufacturing the shafts. Economies of scale and scope in this example were achieved by FlexLink's adjusting of its shaft manufacturing activity with the manufacturing activities related to the large round products of MS4, so that the lathing machines of MS4 could be used for them. Here, FlexLink benefited from MS4's experience with the technology, as well as the opportunity to access a wider scope of resources of MS4, instead of having to deal with the difficulties of establishing a new supplier relationship or investing in such operations internally.

Another way for a buying firm to economize on scale and scope across connected relationships is to explore similarities in the sub-supplier relationships of its suppliers. Every supplier has supplier relationships through which it buys certain materials or components, or has certain operations performed. The activities that those sub-suppliers undertake for the focal supplier of a buying firm can be explored by the buying firm for similarities with activities the buying firm needs. When the buying firm introduces new activities to its relationship with the supplier, it can take advantage of the opportunities that the supplier's relationships with the sub-suppliers can offer. Economies of scale and scope can then be exploited from increasing utilization of resources shared within those sub-supplier relationships, by introducing activities with similarities with those of the sub-suppliers.

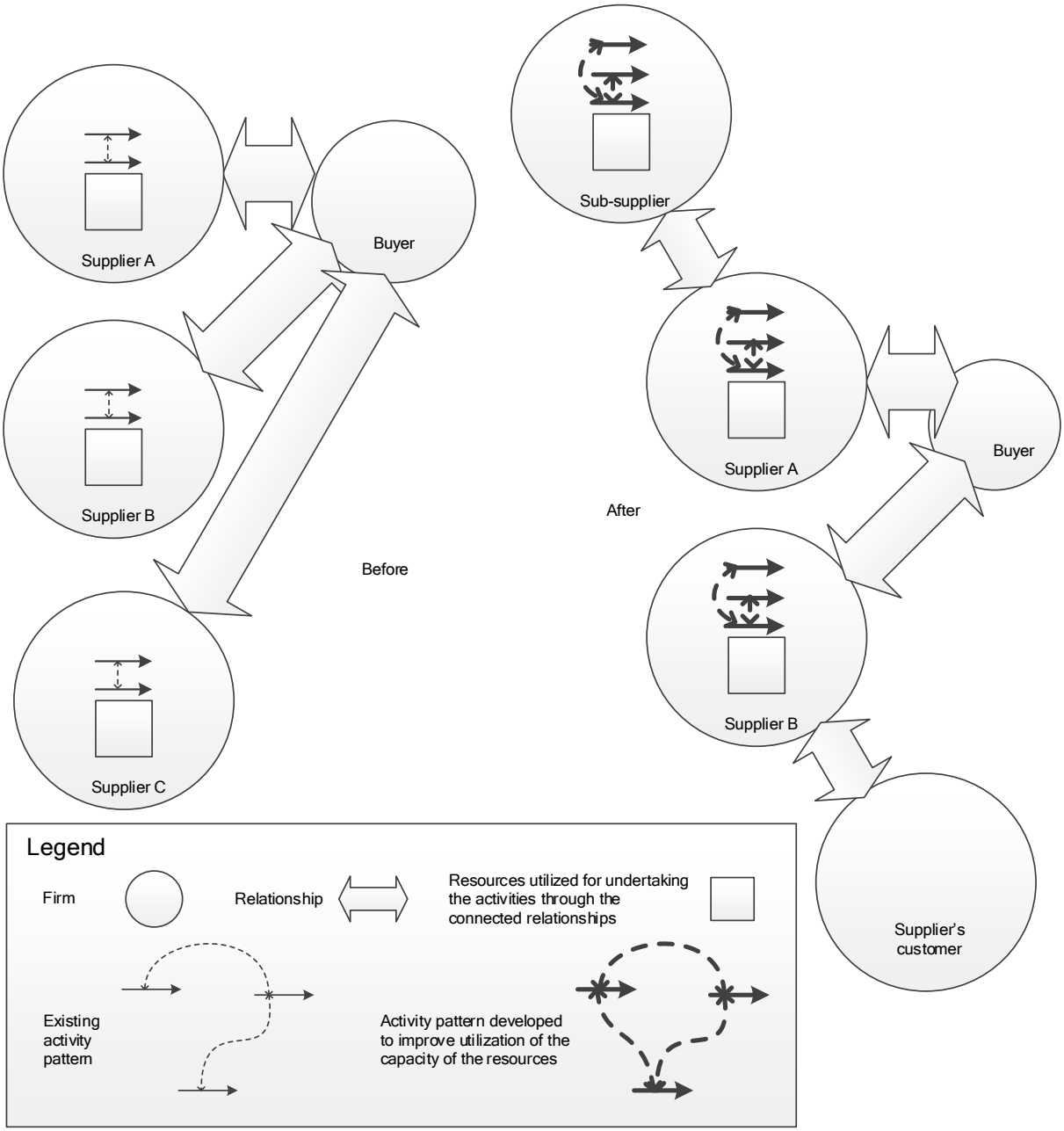


Figure 6-3: Economizing on scale and scope across connected relationships by adjusting in activity patterns

As an example, consider FlexLink's relationship with DC1, in which FlexLink wanted to solve a quality problem with the painting of an aluminum die-cast connecting strip. For painting, FlexLink could choose from multiple alternatives that suit its design and usability of the product. FlexLink economized on scale and scope by selecting the type of painting based on DC1's existing sub-suppliers for painting. Among those sub-suppliers, one offered FlexLink a painting option that suited its requirements, so FlexLink designed the manufacturing activities of the product in a way so that that specific sub-supplier relationship could be used by DC1. Such an approach can result in economies of scale and scope by better utilization of the resources of the painting sub-supplier by DC1 (or by DC1's relationship with the sub-supplier as a resource), and this would eventually benefit FlexLink in several different ways. Not only could lower costs be expected due to higher resource utilization and sharing the resources of the sub-supplier, but also the experience of

working together that DC1 and the sub-supplier have, combined with the knowledge and expertise the sub-supplier has with that specific technology, could be useful for FlexLink.

6.1.2 ADAPTING RESOURCES FOR IMPROVED UNDERTAKING OF SIMILAR ACTIVITIES

The focus of a firm's economizing on scale and scope can be on developing how resources are related to each other in order to undertake additional similar activities using the resources. Each resource has a certain capacity, and is capable of undertaking a certain range of activities. However, no resource is taken for granted; over time, the buying firms and their suppliers may have new conditions for scale and scope, and may want to change the scale and scope of activities that use their resources. Furthermore, a buying firm may focus on a single supplier relationship for a particular change, or have developments in mind that would directly affect multiple connected relationships. Below, those directions and scopes are discussed.

Each resource may be utilized for multiple activities. Economizing on scale and scope by increasing the performance of similar activities entails developing the resource dimension so that more activities or a higher volume of activities can be undertaken using the resources in focus. Economizing on scale and scope with this focus and direction can take different forms, depending on whether it is practiced with a relational scope or a wider scope encompassing multiple connected relationships.

Relational resource adapting for similar activities undertaking

In a buyer-supplier relationship, this form of economizing can be done by changing the features of a resource in order to make it usable for other activities or to increase the volume of the activities that are already utilizing the resource. With a relational scope, the aim is to increase the similar activities (or their volumes) to which a resource is applied by raising the efficiency or capacity of the resource. In doing so, the scale or scope of the similar activities utilizing a resource are not necessarily increased. Instead, the focus is on increasing the potential of a resource for gaining higher economies of scale and scope. Increasing the scope involves redefining "similarity" for activities. By modifying a resource with the aim of enabling it to be utilized for a wider range of activities, the definition of similarity for certain activities is extended to encompass that wider range.

This form of economizing can also be achieved by reducing the switching time between multiple activities. In the plastic injection-molding example in section 6.1.1, switching between activities of manufacturing each plastic injection-molded item required changing the molding tool and making other adjustments to the machine. If the buying firm invests in and helps find a technical solution to shorten the time it takes for the supplier to switch between jobs on that machine, the buying firm has made the resource capable of undertaking more activities and thereby economized on scale and scope.

Alternatively, the buying firm may try to improve the capacity of a resource by other technical means, such as shortening the time required for undertaking each activity or adding identical resources to increase the capacity. One example is if, in the example above, the buying firm's investments in the relationship are directed towards redesigning the product so that it can be manufactured more efficiently. Another example is when FlexLink sent engineers to MS3's factory to assist in technically improving the efficiency of those resources of MS3 that FlexLink

accessed. Alternatively, FlexLink could have economized on scale and scope by investing in purchasing another of those machines for MS3 to increase its capacity.

Furthermore, the buying firm may invest in providing the supplier with additional resources that help the supplier perform the activities more efficiently or more effectively. This was seen in the case where FlexLink invested in designing a tool for MS3 to perform quality inspections of the steel-top plates that had a quality problem in 2011. Using the tool, MS3 was able to test every product immediately after production in an efficient manner, and avoid delivering faulty products or having to manually measure each product. As a result of this change, the steel-top plates could be first measured after initial manufacturing activities, and the remaining activities could be performed only on the products that had passed the quality check. Figure 6-4 illustrates this form of economizing on scale and scope.

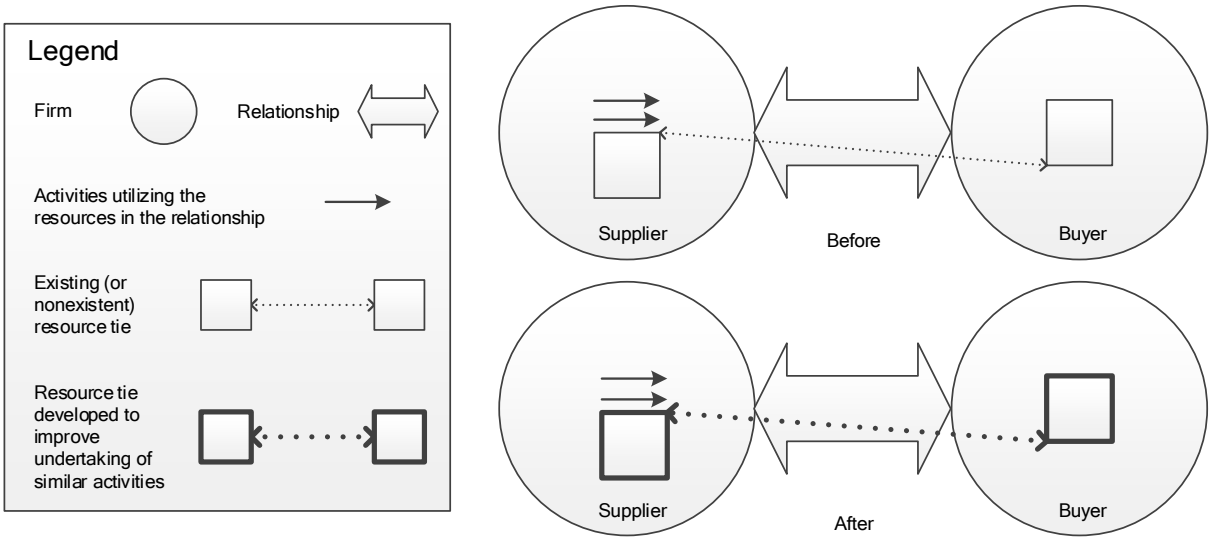


Figure 6-4: Economizing on scale and scope in a supplier relationship by adapting through resource ties

Inter-relational resource adapting for similar activities undertaking

Economizing on scale and scope with this focus and in this direction can also have an inter-relational scope. From a buying firm's perspective, opportunities for increasing the undertaking of similar activities can exist anywhere in the network, and to economize on scale and scope it may need to proactively connect certain relationships and take advantage of such connections. The buying firm can develop its connected relationships in such a way that the resources of a supplier, which the buying firm accesses, are further utilized for undertaking new activities that relate to the other customers of the supplier. The buying firm opts for sharing the resources of the supplier with more customers, and through that decision gains economies of scale and scope. The focal buying firm may also benefit from the new development possibilities that other actors can bring when sharing a resource with it. Furthermore, such a development may be needed in situations where the buying firm wants to reduce the reliance of the supplier on the buying firm's business. Figure 6-5 summarizes and illustrates this form of economizing on scale and scope.

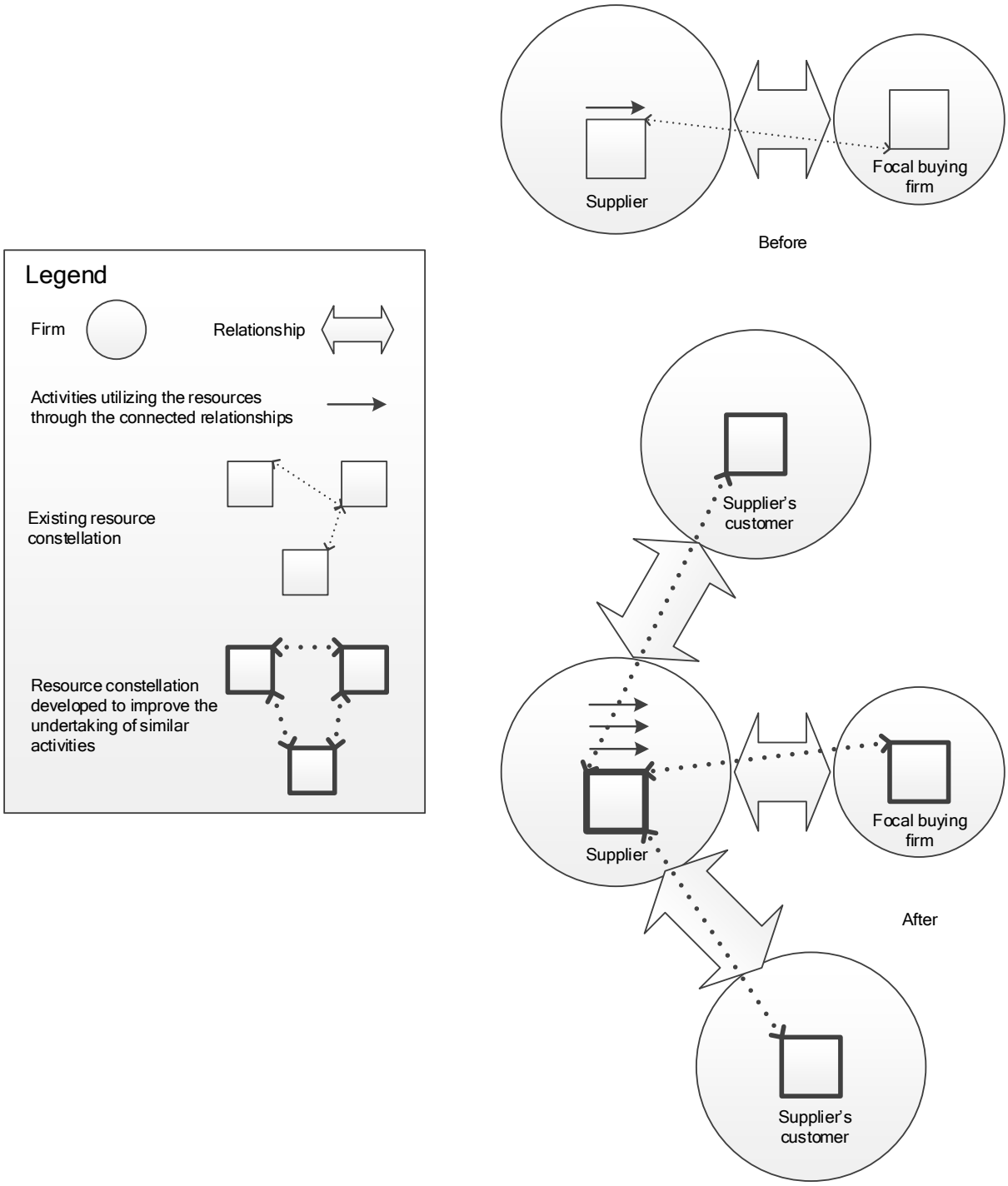


Figure 6-5: Economizing on scale and scope across connected relationships by adapting in resource constellations

An example of this form of economizing on scale and scope was seen in the FlexLink–IM2 relationship. FlexLink was by far the most important customer of IM2, and wanted IM2 to attract other major customers with whom FlexLink could share IM2's resources. To achieve this, FlexLink assisted IM2 in finding and establishing a relationship with other buyers of plastic parts that could be produced with the plastic injection-molding machinery of IM2. This assistance included encouraging IM2 and investing in supporting its efforts to find and connect with new customers.

In order for multiple customers to access a resource of a supplier, the resource needs to be adapted in various ways to all of them. FlexLink's economizing on scale and scope here takes the form of assisting with the technical adaptations required for making this happen. Furthermore, economizing on scale and scope in such situations may go beyond technical adaptations, because sharing a resource of a supplier with multiple customers dictates that the supplier needs to handle every customer's needs, not only technically but also administratively. This may entail new limitations for the focal buying firm when working with the supplier, which need to be resolved through administrative resource adaptations.

6.2 ECONOMIZING ON INTEGRATION IN A SUPPLY NETWORK

Economizing on integration is about developing actors and activities in relation to each other. The case analysis in chapter 5 showed a variety of ways that a buying firm may economize on integration when developing its supply network. Economies that are achievable in this way are manifold. Improved coordination of activities can, for example, result in opportunities for more efficient production and more accurate inventory planning. Firms may want to enhance their activity coordination or increase their jointness in order to shorten lead times, lower inventory levels, or improve product availability. Moreover, the case illustrates possibilities that economizing on integration brings about that are vital for the continuation of a relationship or even the survival of either of the parties involved.

Economizing on integration is defined as *"to improve the handling of sequentiality of activities and the jointness of the actors involved."* How the handling of these sequentialities might be improved, in this sense, is defined based on the circumstances and needs of the buying firm in focus. This can be done by relating actors or adjusting activities in different directions and with different scopes. In this section, dimensions of economizing on integration (see Figure 6-6) are discussed with regard to what is being developed by a buying firm – a supplier relationship or a set of connected relationships.

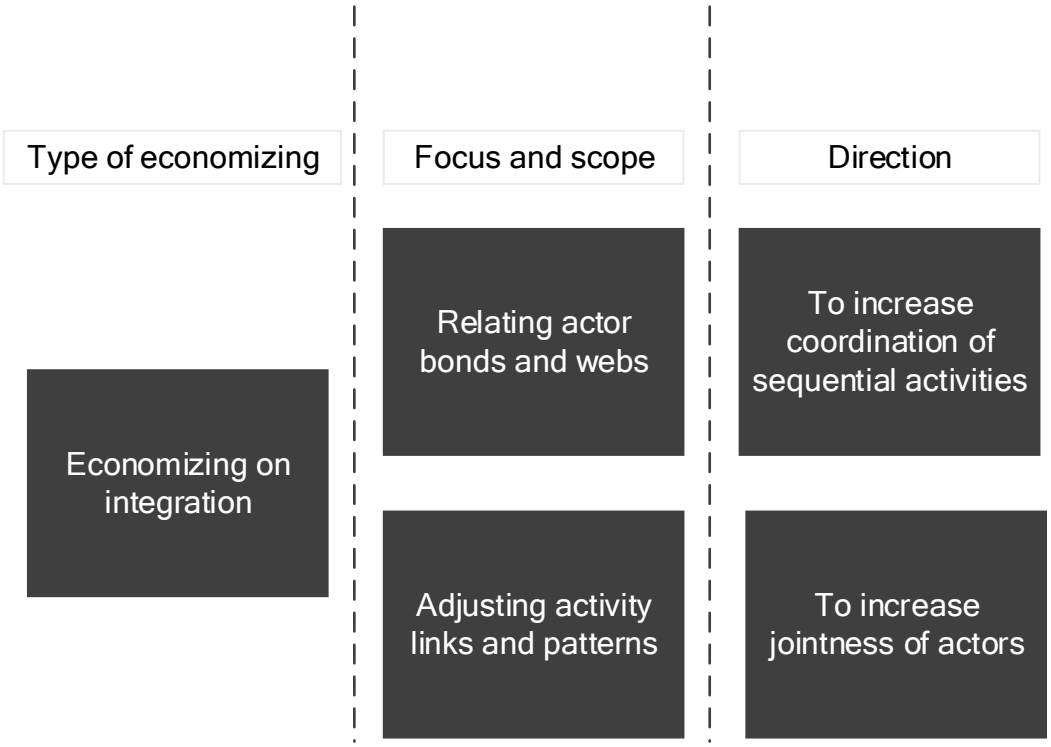


Figure 6-6: Dimensions of economizing on integration on supply network development

6.2.1 *RELATING ACTORS FOR IMPROVED COORDINATION OF SEQUENTIAL ACTIVITIES*

Economizing on integration can be accomplished by focusing on developing the actor dimension of the network, and trying to change how actors interact with each other in relation to how those actors undertake their sequentially interdependent activities. In the supply network of a firm, actors undertake activities that are sequentially interdependent, and interact to coordinate those activities. Developing the supply network with this focus aims to improve that coordination. Below, the focus and direction are discussed in relation to the relational and inter-relational scopes.

Sequential activities need to be coordinated, and through increased coordination they can be undertaken more efficiently. Firms may want to increase coordination of their activities because in this way they would be able to plan better for undertaking their activities, taking into consideration the plans of the other parties involved. Firms may even strive for joint planning and scheduling for undertaking their activities. Economizing on integration by enhancing possibilities for coordination of sequential activities entails changing how actors interact and with which other actors they are related regarding the activities in focus. In other words, one way to economize on integration is to examine the relatedness of the actors in the network, and analyze what it means for the job of coordination of their sequentially interdependent activities.

Relational actor relating for sequential activities coordination

When two actors are engaged in sequentially interdependent activities, each of the actors needs to undertake its respective activities by taking into consideration the related activities undertaken by the other actor. The possibilities that exist for the two actors to coordinate their activities with one another depend on the closeness of the cooperation between the two actors and whether the interaction platform for a required level of coordination exists. When a buying firm is considered to have a close relationship with one of its suppliers, the relatedness of the actors can feature frequent contacts and interactions for different purposes, especially for the coordination of their

activities. These interactions become especially important for the firms' economizing on integration when they concern the undertaking of activities. Discussing logistical issues, delivery problems, joint production and inventory planning, and the like are examples of such interactions. However, if two firms are in a so-called "distant" relationship, where activity coordination-related interactions are limited to, for example, purchase orders and call-offs, such possibilities for economizing on integration would be limited accordingly.

Changing how actors relate to each other in two firms is not an easy task; there can be various barriers in the way that need to be removed. The firms involved can economize on integration by applying efforts and investments toward removing those barriers, with the goal of improving the way sequential activities are undertaken by and coordinated between the two firms. Barriers can be of different types; there can be barriers to interaction, regulation-related barriers, and more.

For example, recalling the case, MS4 used a sub-supplier to produce pins that were ordered in high volumes by FlexLink. The pins were used by FlexLink either in assembly operations or as component sales. FlexLink had certain problems with such arrangements, among which were difficulties in coordinating the assembly operations and the pin production, as well as problems in communicating about and adjusting its inventory plans with the production plans of the sub-supplier producing the pins. Every change in the purchase orders had to go through MS4, and MS4 was not able to fully control the resources of the sub-supplier. In other words, the performance of the sub-supplier's activities could not be directly coordinated with the activities of FlexLink that were sequentially dependent on the pin-production activities.

To complicate matters further, there were multiple activities in between those two, which had made the process even more complicated to handle and coordinate. In that situation, FlexLink economized on integration by eventually changing the supplier and removing the middleman so that closer interaction became possible. The change included establishing a relationship and getting directly involved with MS7. Alternatively, FlexLink could have tried to create a platform for directly interacting with the sub-supplier, but given the circumstances of the FlexLink-MS4 relationship, this was not considered to be a viable option.

In another example, from a geographical point of view, FlexLink's location in a specific industrial zone in China played a key role. In that locality, a certain type of import/export license was needed for transactions that crossed the borders of the zone. FlexLink was in a relationship with MS8 for manufacturing machined shafts in China, but MS8's factory was located outside that industrial zone and MS8 did not have such a license. This necessitated a long process of going through a third-party import/export company or other complicated customs processes between the shaft production activity of MS8 and the use activities of FlexLink. Coordination of such activities was clearly a problem, let alone the extra-long lead times and additional costs. To economize on integration, FlexLink could have made investments towards acquiring an import/export license for MS8, but that was not worth the benefits FlexLink would gain by working with MS8. Hence, FlexLink decided to replace MS8 with a supplier that either already had the proper license, or was located inside the same industrial zone. Such a logic can be extrapolated to other types of barriers as well; for example, infrastructure problems or language and cultural issues in an international context.

The same form of economizing on integration can be understood in terms of emphasizing the time dimension of coordinating activities between a buyer and a supplier. Each of the two firms involved in a buyer-supplier relationship has its own priorities and considerations for when to conduct their activities. In such situations, changing how actors are related to each other can make it possible for either party to give higher priority to the activities involving that specific other party (compared to the activities involving external parties).

This relating of actors can bring about various economies of integration. The case points at an example of a relationship in which not achieving such economies caused serious problems for the relationship. In the period from 2004 to 2009, FlexLink's constant transfers of activities from MS2 to MS3 damaged the relationship between FlexLink and MS2. From MS2's perspective, the relationship was reaching an end, and over time it became less interested in cooperating with FlexLink's purchasers and engineers. Accordingly, in its operations planning, MS2 began to prioritize other customers ahead of FlexLink, so that FlexLink's orders received a slower response. Scheduling production for the purchase orders of FlexLink that arrived randomly over time, in between the purchase orders of MS2's other (now higher priority) customers, made it less likely that MS2 would start production for FlexLink immediately upon receipt of each purchase order. With these latest changes, production planners in MS2 were not motivated to deal with such issues favoring FlexLink's purchase orders. FlexLink purchasers realized this lack of interest of MS2 in the relationship, and this made them less interested in the relationship, too.

In the FlexLink-MS2 relationship, neither of the two parties made an effort for closing the distance that had emerged between the actors. If such efforts had been made, changes in how actors are related to each other (which could be a result of various interactions and investments in the relationship over time) could have made it viable for MS2 to prioritize the purchase orders of FlexLink upon arrival. However, that could also have caused inefficiencies in the utilization of MS2's resources and adversely affected its economizing on scale and scope. Still, this could have shortened lead times and brought other economies of integration to the relationship. Over time, MS2's prioritization of activities related to customers other than FlexLink became unbearable for FlexLink. FlexLink found it too difficult to work with a supplier that paid it too little attention, and this eventually ended the FlexLink–MS2 relationship. Figure 6-7 illustrates this form of economizing on integration.

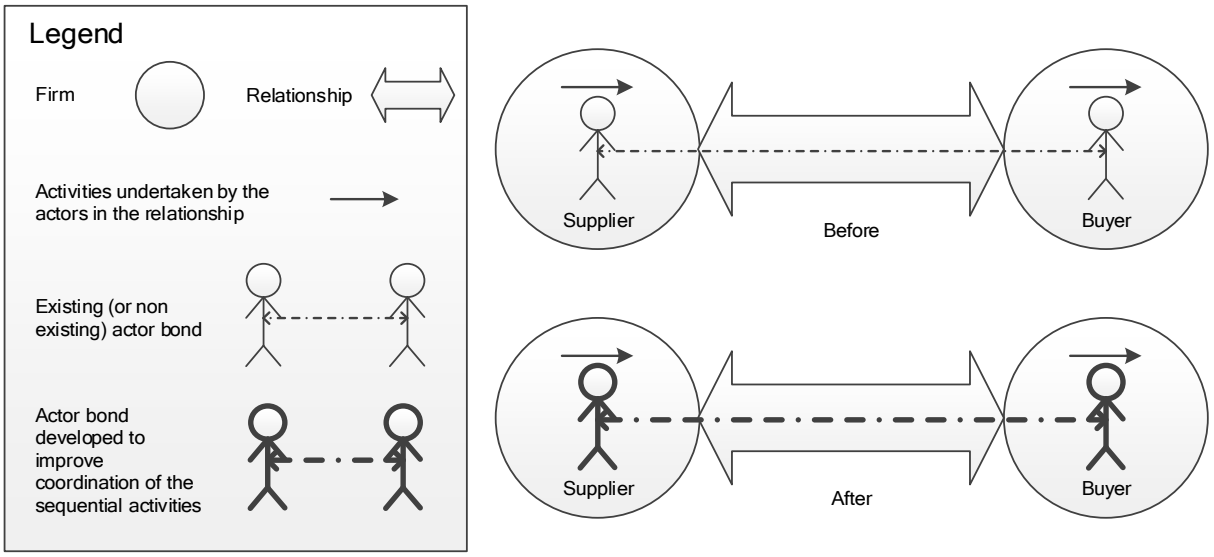


Figure 6-7: Economizing on integration in a supplier relationship by relating through actor bonds

Inter-relational actor relating for sequential activities coordination

As Figure 6-8 shows, many of the ways of economizing on integration that require a relational context are also possible when the scope of development is wider than a buyer-supplier relationship. For a buying firm, opportunities for economizing on integration in a supplier relationship may lie in another of its relationships; for example, another supplier, a sub-supplier, or another customer of the supplier.

Exploiting such possibilities in the supply network can bring important benefits. As shown in the case analysis, when FlexLink's relationships in China became important due to the volumes and varieties of products involved, several actors – specifically DC1, IM3, FlexLink's Malaysian assembly unit, and FlexLink's warehouse in Germany – became responsible for undertaking certain sequentially interdependent activities that required deliberate coordination. Volatility in the respective demands for the products involved, as well as the constant introduction of new products into FlexLink's catalogue, made such coordination more crucial than ever. However, the relationships between FlexLink and the Chinese suppliers had not yet become close. There were various barriers in the way, and an efficient activity coordination platform was not yet in place. The limited involvement of FlexLink and those suppliers in their relationships with each other for activity coordination created significant additional costs for FlexLink when numerous emergency deliveries through expensive air freight were made to avoid lost sales and backlogs.

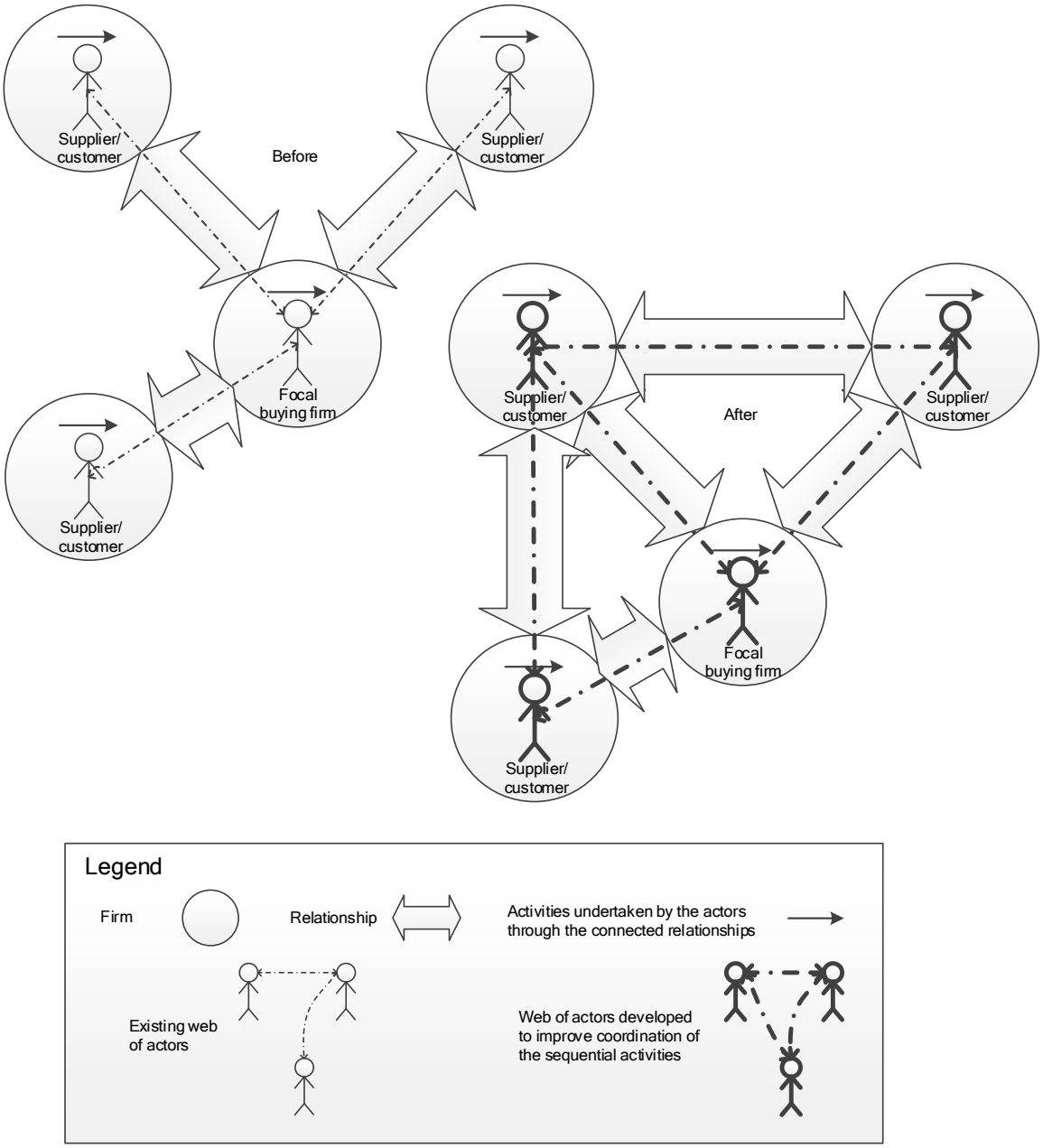


Figure 6-8: Economizing on integration across connected relationships by relating in the web of actors

Coordination-related problems of this kind can be avoided by economizing on integration with a focus on relating actors in the supply network to increase activity coordination. This can be accomplished, for example, by linking two suppliers to each other in order to benefit from their cooperation. The focus of such cooperation is on gaining economies of integration. As was shown in the case, in the relationship between FlexLink and AG1, import/export licensing had caused a major problem, resulting in additional costs and longer lead times. AG1 did not have an export license, and had to use an import/export agent to intermediate in its relationship with FlexLink. To economize on integration in this situation, FlexLink searched its supply network and found that SS1 could possibly solve the problem. FlexLink facilitated the establishment of a relationship between AG1 and SS1, whereby AG1 would sell its products to SS1, and SS1 would sell them to FlexLink with a reasonable margin. Connecting the two supplier relationships meant a change in the way SS1 and AG1 were related to each other. Additionally, increases in investments and attention paid by the three parties to these two buyer-supplier relationships made all of them closer

to each other than before. All three parties benefited from this relating of actors; for FlexLink and AG1, increased coordination of activities was essentially at the core of the benefits derived from this change.

In another example, the relating of actors entailed FlexLink and one of its suppliers taking on important coordination roles between some of FlexLink's suppliers. The "idler end model 1" product comprises a number of components, each of which is manufactured by one of FlexLink's suppliers. After manufacturing, all components must be assembled, and FlexLink decided to outsource the assembly operation. The vast geographical and operational spread of those activities required considerable coordination. In order to be able to properly coordinate those activities, FlexLink needed to actively relate the suppliers involved in those operations. Hence, FlexLink took on the responsibility of buying certain components from DC1 and MS3 and selling them to MS6, depending on when they were needed for production. MS6 bought other components from IM2 and BR2 (other suppliers of FlexLink), and assembled all of those items together with the components it manufactured. Having the responsibility of buying from some suppliers and selling to certain other suppliers was a challenge for FlexLink, but it was only made possible due to its efforts in relating those actors and enabling economizing on integration in terms of improved activity coordination across multiple relationships.

6.2.2 ADJUSTING ACTIVITIES FOR IMPROVED JOINTNESS OF ACTORS

The second form of economizing on integration, in the focus dimension, concerns development in the supply network with a focus on changing sequential activities and their linkages. Sequential interdependence between two activities means that completion of one is a prerequisite for the other; for example, manufacturing and assembly, lathing and surface treatment, or transportation and storage activities. Sequential interdependence can also extend beyond two activities; multiple activities can be sequentially interdependent.

Because of sequential interdependence, the undertaking of such activities has to be coordinated. However, this can involve different degrees of coordination: Two sequential activities may be tightly coordinated, or, the coordination between the two parties responsible may be loose. A JIT system is an example of tight coordination of sequential activities, while loose coordination can be exemplified by a situation where the coordination activities between two parties are limited to the customer's call-offs – without the knowledge or consideration of the supplier's other tasks. Other examples of loose coordination of activities include when a supplier makes to stock and dispatches to order without the knowledge or consideration of the customer's forecasts and other plans, or when the supplier starts planning for undertaking an activity only when an order comes in, without having any information about it in advance.

The way activities are coordinated has implications for how close the actors in a relationship or in multiple relationships are; in other words, the jointness of actors is affected by the coordination of their activities. There can be relationships with high jointness and high activity coordination, but there can also be relationships where high jointness is made possible in a different way than through extensive coordination of activities. This form of economizing on innovation focuses on adjusting activities, their links, and their patterns in order to make the actors involved closer to each other in terms of jointness. This focus and direction are discussed below, emphasizing the

differences between relational and inter-relational scopes of this form of economizing on integration.

Relational activity adjusting for actors' jointness

Economizing on integration in a buyer-supplier relationship can focus on developing activities and how they are related to one another between the buyer and the supplier in order to increase the jointness of the actors involved. This may be in order to remove certain inefficiencies in the way activities are conducted by one actor in relation to the other, or to create possibilities for gaining different advantages related to economies of integration, such as shorter lead times or lower inventory levels (see Figure 6-9).

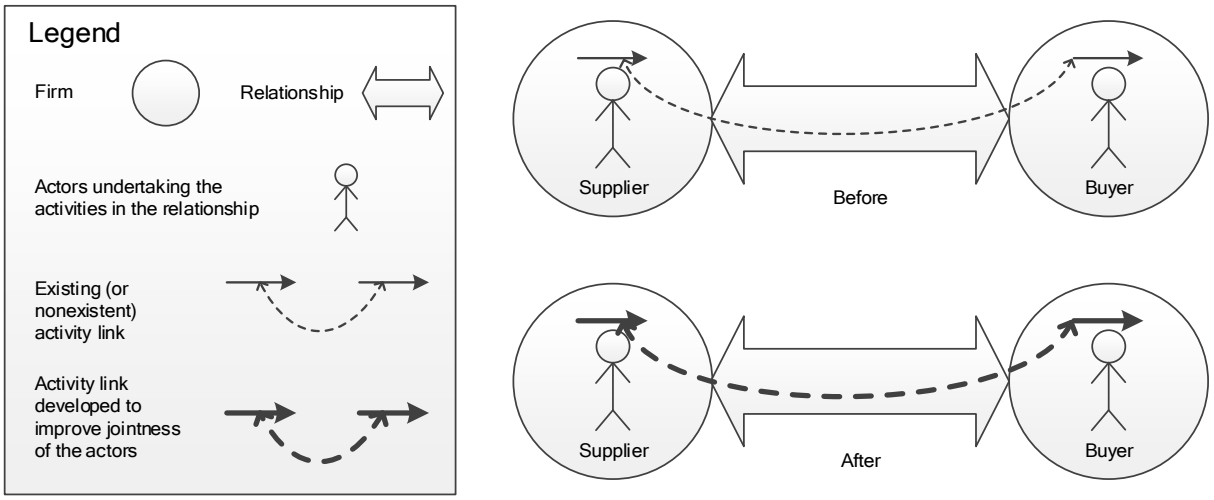


Figure 6-9: Economizing on integration in a supplier relationship by adjusting through activity links

An example of this form of economizing on integration can be seen in the form of MS3's new sandblasting machine in 2009. Before 2009, production activities were arranged so that after a certain number of batches of the components were machined, they would be sent to a sub-supplier for sandblasting to create a smoother surface, returned to MS3 for additional operations and packaging, and then shipped to FlexLink. Every time a new purchase order for those components arrived from FlexLink, MS3 produced the components and shipped them to the sub-supplier for sandblasting. The sub-supplier performed the sandblasting operation according to its own production schedule, and this meant that the components had to wait for the sandblasting operations for an unexpected length of time. In the same way, since the timings of MS3 and the sub-supplier did not necessarily match, the components also had to wait in the production queue at MS3 on their return from the sub-supplier's site. In 2009, an attempt to remove these inefficiencies in order to shorten lead times was made, with MS3 insourcing the sandblasting activities. This rearrangement of the activities meant that FlexLink would only need to coordinate with MS3's production schedule. This created an opportunity for FlexLink and MS3 to increase their jointness by adjusting their activities and the way those activities related to each other. In this case, economies of integration appear as increased jointness among the two firms, made possible by changing the way particular activities are linked to each other.

Firms can also economize on integration by developing activity links in a different way. Buying firms and their suppliers have deals with each other. Those deals usually concern time; for example, a certain amount of orders are promised over a given period of time with different

conditions, or a certain set of deliveries can be pre-booked over a limited period of time. Either way, time is an important factor when it comes to how actors undertake their activities in relation to each other. However, either side of a buyer-supplier relationship may face difficulties meeting the promises it has made to the other party. In such situations, economizing on integration means that the party that is not facing those difficulties agrees to make short-term compromises in order to help the relationship survive. Making this happen requires investments from the party that is compromising, and such investments have to be motivated and supported within a good relational atmosphere. It takes trust and commitment to compromise, and compromising can produce higher levels of trust and commitment between the parties involved.

For example, in 2010, SS1 had recently begun manufacturing certain small stainless-steel components for FlexLink. SS1 was a relatively small and inexperienced supplier, and the start of the relationship was characterized by FlexLink's major investments in educating SS1's employees, and SS1's dedication to cooperation and learning. FlexLink made a large commitment of purchase orders to SS1 in the contract, because FlexLink had just entered the stainless-steel products market and the estimated demand for the products was high. The first year passed with lots of products being manufactured by SS1 and sold by FlexLink. However, the demand for these products was not as high as expected, and this created large inventories of the components at FlexLink.

To solve the problem of excess inventory levels – and to avoid even higher inventory levels for the next year – FlexLink needed to economize on integration. FlexLink accomplished this by negotiating with SS1 for a short-term compromise to lower production and retain a portion of the inventories. Although SS1 had planned for and already manufactured the bulk of the purchase orders promised for the next year, proper interaction and the good relationship atmosphere that had been created in the beginning of the relationship made such compromises a viable option for SS1. SS1 felt safe to assume that FlexLink was taking a long-term approach to the relationship, and put the compromise in a longer-term perspective. The undertaking of activities by the two firms was adjusted so that increased jointness among the actors could be achieved. FlexLink achieved economies of integration in terms of reduced inventory levels, and avoiding extra costs of not-yet demanded but already manufactured products.

Inter-relational activity adjusting for actors' jointness

When it comes to developments that have an inter-relational scope, firms can also economize on integration by adjusting their activities and activity patterns. The core idea here is to utilize opportunities in one part of the network to economize in another part of it. One way to do this is to make a supplier responsible for undertaking certain activities and coordinating some other sequentially-related activities that are undertaken by other actors, such as sub-suppliers or other suppliers of the focal buying firm. Figure 6-10 illustrates this form of economizing on integration.

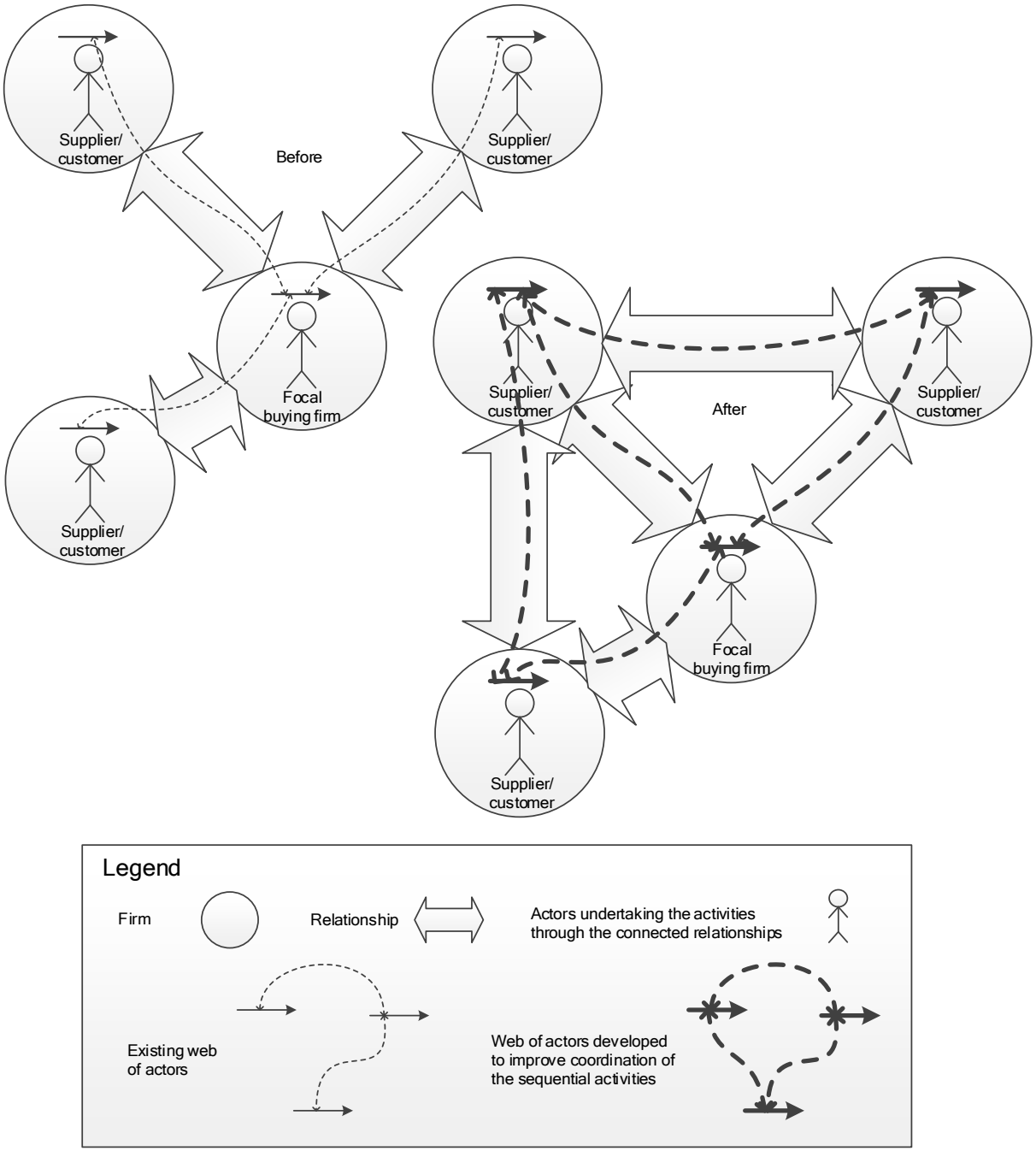


Figure 6-10: Economizing on integration across connected relationships by adjusting in activity patterns

Take the example of the establishment and development of a relationship between MS3 and ST1 during the development of a FlexLink product with special surface treatment requirements. From the viewpoint of FlexLink, planning, production, purchasing, and sales units of FlexLink, MS3, and ST1 were being related to each other in order to improve activity coordination through reduced need for coordination-related interaction among actors. To achieve that, the activities of the firms involved needed to be adjusted. This development required that the activities that FlexLink, MS3, and ST1 undertook in relation to the nitrocarburized products be rearranged in such a way that MS3 could take on the responsibility of coordinating them. The contributions that FlexLink, MS3, and ST1 made in order to achieve this prerequisite were economizing on integration by rearranging activities across connected relationships. MS3's production and packaging activities had to be

adjusted to ST1's surface- treatment activities, and all of those had to be adjusted to FlexLink's transportation, inventory management, and sales activities.

Adjustments can comprise several different types. Certain activities may need to be redesigned so that they can be sequentially undertaken by different actors. Perhaps the surface-treatment process needed to be adjusted to conform to the way the products were manufactured by MS3, and the undertaking of surface-treatment activities at ST1 had to be coordinated through MS3 with FlexLink's routine transportation activities, and fluctuating policies for inventories and sales. MS3 needed to adhere to delivery deadlines to the consolidation point in China; this would enable FlexLink to perform its transportation activities more efficiently, have the products delivered with expected lead times, and execute its inventory management policies to meet the demands of its sales activities. Developing the network by adjusting activities of the three parties involved increased the jointness of FlexLink, MS3 and ST1, which brought about the benefits discussed above. The same outcome can be seen in the example of FlexLink's development of its relationships with DC1 and IM3 (discussed in section 4.4.5), where the increased jointness (which was the desired outcome) was a result of rearranging activities between the three parties involved.

6.3 ECONOMIZING ON INNOVATION IN A SUPPLY NETWORK

Besides striving for the previously discussed economies, the case analysis in this study examines various instances where firms economize on innovation. Economizing on innovation is defined as *"to improve the co-evolution of actors and exploration of versatility of their resources."* Being able to make and/or develop "new things" is the core of the logic behind economies of innovation. Developing new products, solving problems of different types, and learning are the main benefits that firms can expect from their efforts towards economizing on innovation.

Economizing on innovation can be realized by focusing either on adaptation of resources and their ties and constellations, or on relating actors and their bonds and webs. In the former case, adaptation of resources is intended to increase co-evolution of actors, while in the latter case, the direction for relating actors is increased exploration of resource versatilities. Different forms of economizing on innovation are discussed in the following two sub-sections with regard to the scope of economizing, covering the relational or inter-relational forms (see Figure 6-11).

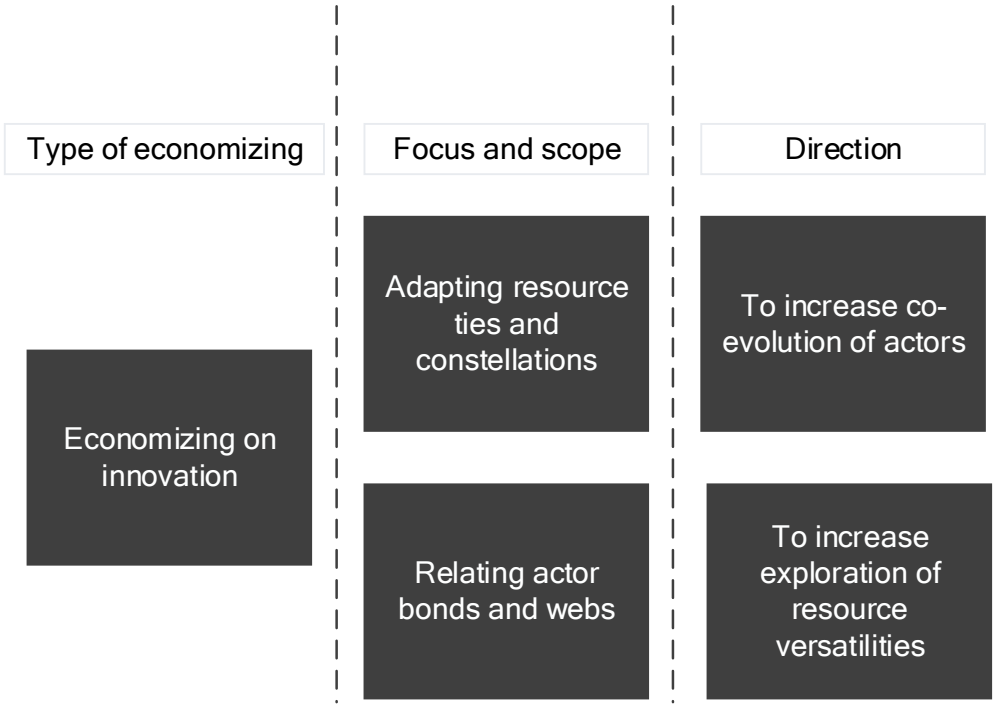


Figure 6-11: Dimensions of economizing on innovation on supply network development

6.3.1 ADAPTING RESOURCES FOR IMPROVED CO-EVOLUTION OF ACTORS

This form of economizing on innovation focuses on adapting, combining, and recombining resources to develop existing and new resources. This includes developing new products, finding solutions to problems of either party, exchanging knowledge, or developing other types of resources in different ways. Development of knowledge-based resources entails learning, teaching, and co-learning. Co-evolution comprises the changes in actors and the way they work as a result of working together. Two or more actors can co-evolve by gaining experience working with each other, getting to know each other better, gaining knowledge from each other, solving each other's problems, or by other means. Co-evolution can involve two actors in a buyer-supplier relationship, or multiple actors in a network that adapt their resources to each other in order to change the way they co-evolve.

Co-evolution of actors is the evolution and advancement of each actor with the help of and in collaboration with the other(s). Through such collaboration, actors can benefit from the possibilities that are available outside the boundaries of their firms for gaining access to new capabilities, developing new offerings, or solving problems of different kinds related to the resources actors utilize. In pursuit of such benefits, the developments in a firm's supply network may take the form of economizing on innovation with a focus on adapting resource ties and constellations towards increased co-evolution of actors.

Here a distinction is needed between "existing" and "new" resource features from the viewpoint of an actor. For a given actor, old resource features are features that the actor has already explored in undertaking certain activities. Such features of the resources of an actor are already combined with certain features of resources of its counterparts in some way and are being utilized in relation to those. New resource features for an actor, on the other hand, are as yet unexplored by that actor. Such resource features may already exist in the network (but are unexplored), or may not yet exist

and must first be created. Whether a resource feature is new or old, or whether it exists or needs to be created, is a matter for the scope of analysis.

Relational resource adapting for actors co-evolution

This form of economizing on innovation through development in supply networks can be achieved by recombining old resource features. In a buyer-supplier relationship, actors combine various resources of both sides of the relationship with the other's resources. This is a process of investigating how resources are combined, and trying to improve it by suggesting new ways in which they can be combined with each other.

Versatility of each of those resources would need to be explored to discover further modification potentials. Exploring such potentials means using resources in focus in new ways in relation to one another: In essence, it is adapting a set of resources with regard to the previous combinations of those resources with each other. Whenever new modification potentials of a resource are explored, the actor controlling that resource evolves. This evolution is relative to the resource that the focal one is being recombined with, and to the new ways that the two resources are being combined. By finding new ways that old resources in two firms can be combined with each other, the actors utilizing those resources evolve in line with each other's resource combinations; in other words, they co-evolve. This process takes into account old resource features (as defined above), as well as the effects of previous combinations of such resource features with regard to new possibilities for resource combining by the actors involved.

Furthermore, the case illustrates that this form of economizing can also involve new resources, since various opportunities may lie outside the boundaries of previously explored resources. Firms may need to take a step beyond the resources they have already explored, and work with resources that they had not previously combined with their own resources. This can be done either by combining new resources[17] with each other, or by combining them with old resources. Either way, in order to economize on innovation, there is a need for creating new resources or accessing resources that had not been accessed before. This form of economizing on innovation emphasizes the need for new resources and the economic benefits that such emphasis generates.

To solve new problems, firms may have to combine their resources with ones that are new to them. This is accomplished by exploring further combination potentials of old resources, and searching for resources (or resource features) that have not been combined with those old resources. The search can be within existing relationships, or involve looking beyond them and searching for new relationships.

Alternatively, this can be accomplished by developing new resources or resource features to combine with old resources. The case contains multiple examples of this form of economizing. FlexLink continually uses its relationships with almost all of its suppliers for new product development and problem-solving. In such situations, new product designs are adapted to include the existing resources of the suppliers, whether through utilizing previously explored features, utilizing explored features, or developing new resources or features and combining those with new product designs. Solving problems also including discovering new resource combinations, whether

[17] In other words, resources new to the firm.

by recombining old resources or by developing new resource features and combining those together or combining them with old resource features.

The FlexLink–IM2 relationship is a good example of an interactive relationship with frequent collaboration among actors. However, in 2008, changes in the ownership and management of IM2 affected the relationship by making its atmosphere significantly more formal. The formalized atmosphere was problematic for how the engineers on the two sides of this relationship used to interact. The daily contacts for joint product development and problem- solving efforts were reduced, because the new IM2 management wanted to limit collaboration to activities that were formally stated in its contracts.

This problem arose at the same time as other network-related issues that had negatively affected the relationship. FlexLink and IM2 engineers were facing considerable difficulties in their co-evolution; reduced collaboration would have limited their opportunities to seek each other's help on a regular basis. FlexLink's solution to this problem was to economize on innovation by further combining resources in the relationship. Ending the FlexLink–IM7 relationship created an opportunity to do this. FlexLink moved production of a large part of IM7's products to IM2 in the hope of increasing the ties between the resources of FlexLink and IM2, and eventually of improving the co-evolution of the actors involved in the relationship.

Another example is in FlexLink's relationship with DC4. FlexLink's gradual moving of production from suppliers in Europe to suppliers in China had negative effects on some of FlexLink's supplier relationships. However, DC4 saw that as an opportunity for widening its technological scope, which brought economies of innovation to its relationship with FlexLink. DC4 invested in acquiring new technologies that made it more attractive to FlexLink, and that saved the relationship from further deterioration.

DC4's investment in new resources was in line with the needs of FlexLink. The new resources that DC4 acquired were such that they could be readily combined with the existing resources of FlexLink. As a result, FlexLink not only decided not to move production of the DC4 products to China, but also, when ending the FlexLink-DC3 relationship, FlexLink moved the production of a part of DC3 products to DC4, expanding its business with DC4. Therefore, DC4's investment in new resources in line with FlexLink's needs increased co-evolution of the actors involved in the FlexLink–DC4 relationship. Figure 6-12 illustrates this form of economizing on innovation.

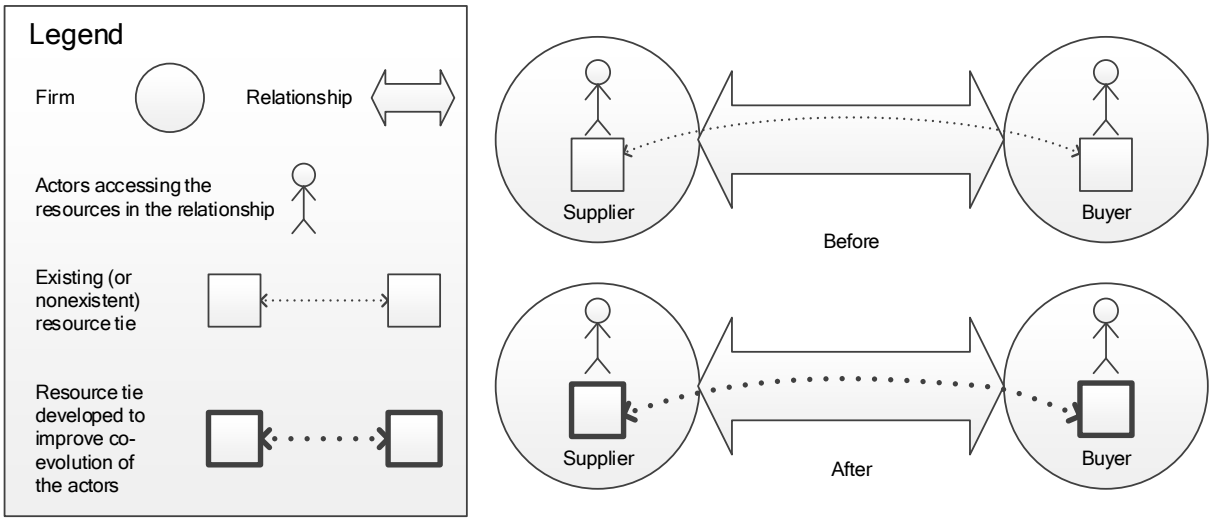


Figure 6-12: Economizing on innovation in a supplier relationship by adapting through resource ties

Inter-relational resource adapting for actors co-evolution

Economizing on innovation by adapting resources is also possible when the scope is expanded beyond a relationship. Connecting relationships or developing relational connections deepens the ties between the resources that the firms involved control. When such development of multiple resource ties across multiple relationships occurs together, it can be understood as the development of a certain resource constellation. This development, when directed towards increased co-evolution of the actors involved, represents economizing on innovation. This can be accomplished either by recombining old resource features with old resource features, or by incorporating new unexplored resource features in any of the relationships involved in the development.

One way to economize on innovation by adapting resource constellations is to benefit from combining the resources a buying firm accesses through one supplier relationship with resources it accesses through another relationship. This is motivated by the argument that not all resources a firm needs for survival and success are under its control. Various problems that a buying firm has in a supplier relationship may have potential solutions in the other relationships of the buying firm. For example, when FlexLink moved its pin production away from MS4 to MS7, starting up the production of such high volume important product with a new supplier was a challenge. There, FlexLink used the help of MS4 in streamlining the change of supplier; MS4 helped with giving access to FlexLink and MS7 to its raw materials. The approval of raw material takes a long time, and having the possibility for MS7 to start production with MS4's raw material brought various valuable advantages to the FlexLink-MS7 relationship. Firstly, it saved costs and made production start faster. Secondly, it facilitated the process of starting up production by letting all sample production use the already approved raw materials, and this way limiting the factors affecting the quality of the products to production. Thirdly, MS4 avoided a major waste of raw material. All in all, this change increased the co-evolution of FlexLink and MS7, and even positively affected the co-evolution of FlexLink and MS4. In the FlexLink-MS7 relationship this created better possibilities for collaboration among the engineers of the two parties. In FlexLink's relationship with MS4 it helped partly improving the ultimately damaged relationship and, as a result, the improved relational atmosphere facilitated solving the exchange rate fluctuation compensation problem.

Another example for this form of economizing on innovation was also presented earlier in the case analysis regarding the development of FlexLink's first products with MS3. FlexLink had asked MS3 to manufacture sample products according to the designs. The designs asked for a certain surface treatment quality. Surface treatment had to be outsourced by MS3, but the problem was none of MS3's existing suppliers had the resources that could fulfill those requirements. Thus, a search began to find a supplier with the required resources, and the result of the search was ST1. The plan was to have ST1 as the sub-supplier that FlexLink accesses via MS3, but in reality FlexLink got involved to a higher degree. The development of the product became a matter of collaboration of FlexLink, MS3 and ST1 as a team. Every time MS3 manufactured a sample product, they sent it to ST1, got it back, and then sent it to FlexLink. During the product development those exchanges of samples were all accompanied by various feedbacks and technical discussions among the engineers in all three firms. This change was focused in the resource dimension; adapting resources of different kinds and changing resource constellations. The direction of this change was increased co-evolution of actors, in the sense that the actors involved needed to collaborate for the development of the new product, and their multiple attempts to recombine those resources in new ways was a facilitator of that collaboration. Figure 6-13 illustrates this form of economizing on innovation.

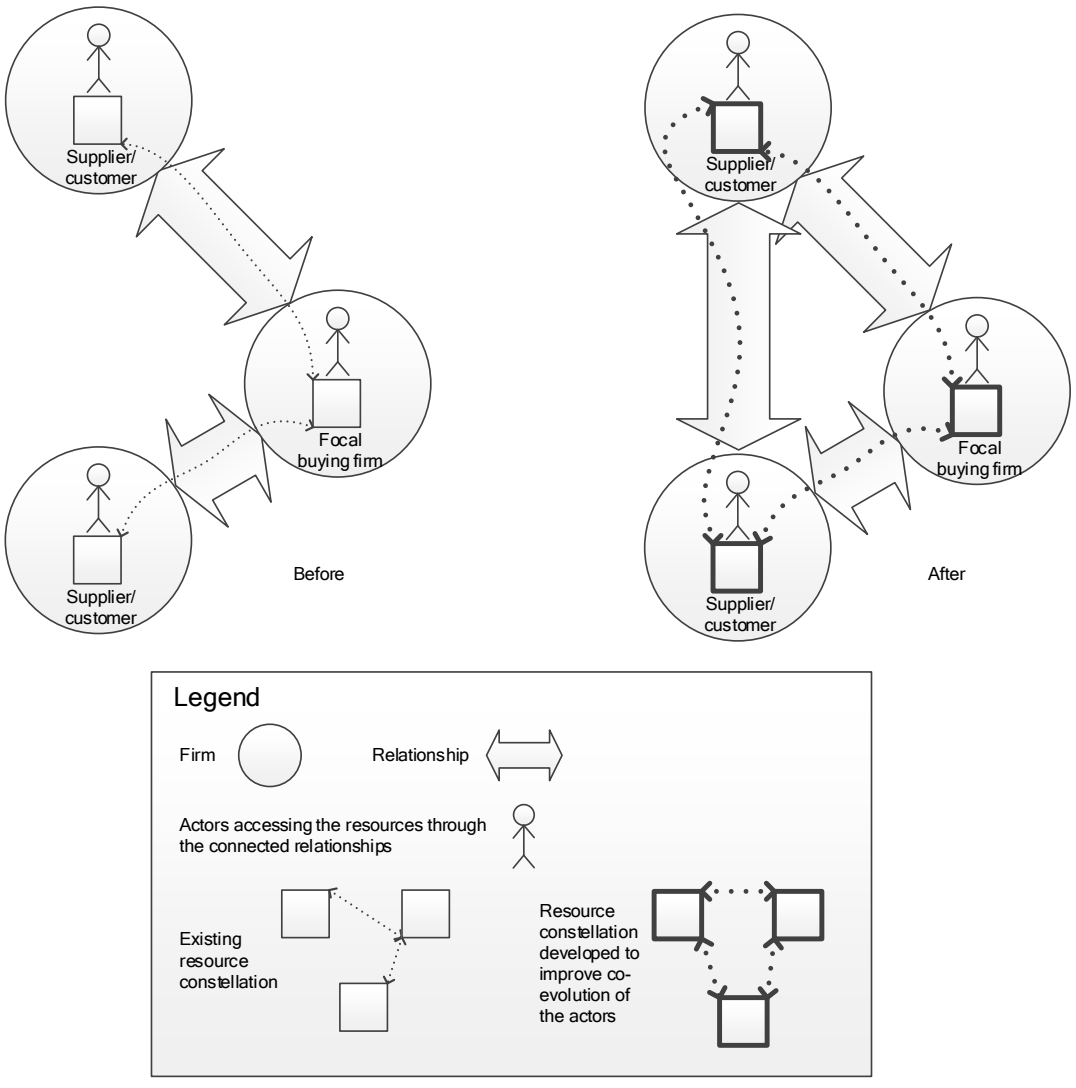


Figure 6-13: Economizing on innovation across connected relationships by adapting in resource constellations

6.3.2 RELATING ACTORS FOR IMPROVED EXPLORATION OF RESOURCE VERSATILITIES

Economizing on innovation can also focus on relating actors for the purpose of changing how resource versatilities are explored, with the intent to increase exploration of such versatilities. New product development, technical problem-solving, or any other task of this nature aims at changing the way resources are related to each other. As shown in the framework, standardized, specified, translated, and interactive resource interfaces can be used to understand how resources relate to each other. Economizing on innovation through relating actors can be achieved by targeting different interfaces for relating resources to each other. Each of the interfaces can also be understood with nuances, so that, for example, a specified interface can be established with different levels of interactivity. The direction towards increased versatility encompasses efforts for more interactive resource interfaces, while the opposite direction favors more standardized ones.

Relational actor relating for resource versatility exploration

To increase the exploration of the versatility of their resources, firms need to focus on relating actors when economizing on innovation. In any buyer-supplier relationship, actors of different kinds may be related to each other, and their relatedness consists of different interaction patterns. One way to economize on innovation with such focus is to strengthen interactions among actors in order to achieve a wider range of explored versatilities for the resources they utilize. To do so, actors may increase their interactions, change the form of their collaborations into more interactive forms, or establish new relationships to create possibilities for exploration of versatilities of their resources.

For example, the experience and knowledge of stainless-steel die-casting technology among FlexLink engineers was quite limited before they established a relationship with SS1. FlexLink did not have the resources to design a product with stainless-steel die-casting technology, and needed the help of a supplier with operational experience to assist it in designing and adding stainless-steel components to FlexLink's catalogue. The need emerged from FlexLink's customers, and was motivated primarily by FlexLink's ambition to expand its product range to satisfy the needs of customers in the pharmaceutical and food industries. Due to the collaboration potential it saw in SS1, FlexLink chose SS1 over another candidate. After a period of relationship-building and frequent technical discussions, FlexLink managed to widen its exploration of the versatilities of its engineering resources and SS1's manufacturing resources. This exploration was made possible by FlexLink's development of the relationship with SS1, with a focus on relating actors via frequent contacts on various organizational levels in order to create a collaborative atmosphere.

Furthermore, a party can attempt to strengthen its interactions in one of its relationships by, for example, removing a middleman and connecting directly with the party on the other side of the focal relationship. This generates increased possibilities for collaboration, as a result of increased interactions between the two parties. The objective of such interactions is to relate the resource contexts of the two firms to each other, and the interactions can be a source for discovering new combination or modification potentials of the resources those actors utilize. For example, beginning in 2002, FlexLink had sourced a set of products from China through an import/export agent, IE1. However, in 2004, FlexLink adopted a more strategic and long-term approach to China sourcing, which meant that working with suppliers through an import/export agent could not fulfill

FlexLink's ambitions for collaboration with Chinese suppliers. Ending the relationship with IE1 and its suppliers – and instead establishing the relationship with DC1 – became starting points for FlexLink's economizing on innovation by relating actors.

Another way in which firms can economize on innovation is through knowledge exchange. In this form of economizing on innovation, actors interact and their collaboration results in exchanging knowledge. This is a process of actors relating to each other, and for each actor it results in developing and learning about new modification and combination potentials of their resources in relation to the other actor's resources. Learning from the other side of the relationship can be one way to achieve these benefits. Each actor has certain knowledge and experience, and increasing the extent to which two actors interact can streamline exchanging this knowledge.

Such knowledge can be used in the future by the actors, which learn to solve similar problems or to develop new products. In other words, this knowledge can facilitate exploration of resource versatilities of the learning side of the relationship, since new knowledge can be used to discover new combination potentials for the firm's resources. One example of this is the problem with the angle bracket discussed in section 4.2.1 above. The collaboration with DC1 taught some new technical lessons to one of FlexLink's design engineers, who pointed out in an interview as an important consideration the engineers would take note of the next time they designed a connecting bracket.

The process of knowledge exchange can also be deliberately designed by a certain actor to transfer certain knowledge to another. Teaching the other party in a relationship can result in better possibilities for exploration of resource versatilities. The technical training that FlexLink invested in in its relationship with MS3 was an example of economizing on innovation by deliberate knowledge exchange with the other party. This can result in discovering new modification or combination potentials of the firms' resources. In the case, those training programs were demonstrated to be critically important in MS3's ability to deliver products with the quality levels required by FlexLink.

Nonetheless, learning and teaching hardly ever take place in only one direction. When one party learns something from another, the latter party can also expect learning effects from the interaction. In certain situations, learning in both directions (or co-learning) can take place as a direct result of the way actors relate to each other. For example, the interactions between FlexLink's design engineers and IM2's production engineers over many years of collaboration, for joint problem solving and joint new product development, have provided each of those engineers with valuable knowledge possessed by the engineers on the other side have. In the long run, their collaboration teaches IM2's engineers how to deal with the specific requirements of FlexLink, while FlexLink's engineers learn how to design their future products so that they would encounter fewer problems in production. This result of relating actors in a relationship is improving the exploration of versatilities of the resources FlexLink and IM2 share.

Joint learning does not have to be as explicit as the exchange or sharing of expertise. When two firms are in a relationship, interactions between actors create possibilities for getting to know each other better. This may facilitate their future collaboration and reveal new opportunities for exploration of resource versatilities. For example, FlexLink's long-term approach to sourcing in

China entailed investing in maintenance and continuous development of its supplier relationships in China. This included frequent technical and administrative supplier support by FlexLink's engineers in its China Sourcing unit, and multiple visits to suppliers by FlexLink's engineers and the managers of different divisions.

Various opportunities for exploring resource versatilities resulted from that approach. For example, when FlexLink sent a new guiderail bracket design to DC1 for production, DC1 came back to FlexLink with a suggestion. The suggestion was to make a change to the design that could result in major savings by avoiding investments in new tools. Given the relatively rare feedback culture that FlexLink had experienced before this in its supplier relationships in China, this was a turning point. The main reason why DC1 had started to behave more interactively in its relationship with FlexLink, therefore enabling exploration of the versatilities of its resources, was FlexLink's investments in applying an interactive approach to the relationship. That approach involved proactively relating various actors (individuals and business units) to each other in the relationship. Figure 6-14 illustrates this form of economizing on innovation.

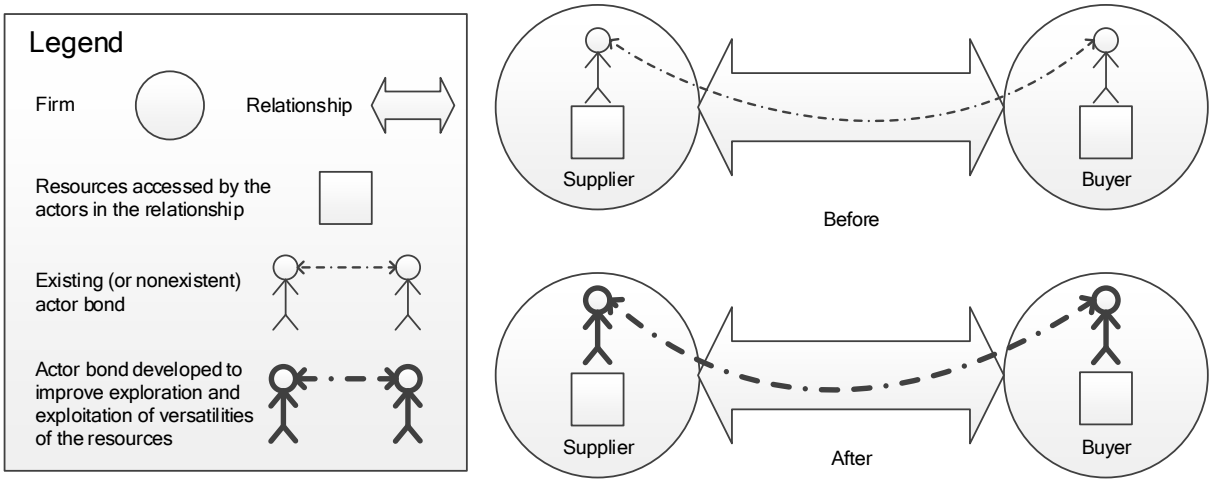


Figure 6-14: Economizing on innovation in a supplier relationship by relating through actor bonds

Inter-relational actor relating for resource versatility exploration

Firms can also economize on innovation by relating actors with a relational scope. Relating actors across multiple relationships can make it possible to combine resources across those relationships. The total resources available in a relationship may not be as high as the firms involved intended to achieve through that relationship. Developing new products or solving the numerous problems related to a specific buyer-supplier relationship may require collaboration with actors that are not directly involved in that relationship.

A buying firm can also achieve economies of innovation by targeting resources outside the relationships of the firm. To develop new products – or solve technical problems that require resources that do not exist within the firm's reach – a new supplier or sub-supplier may be needed. This is achievable when the actors on different levels expand the scope of the actors with which they interact; by establishing a new relationship and connecting it with existing ones, the interactions and collaboration among actors across those relationships enable the focal firm to combine the resources it accesses with new resources, and thereby increase exploration of the versatility of its resources.

An example of this form of economizing on innovation is the quality problem with the wheelbend discs that IM3 manufactured. This problem was relatively old; even before the production of the wheelbend discs was moved to IM3, the previous supplier faced the same problem and neither the supplier nor FlexLink had managed to solve it. After various failed attempts at solving it, FlexLink's product quality manager decided to consult a friend who owns his own company in Sweden and China. They traveled to China to visit IM3, and tried to solve the problem. Although the problem could not be solved completely, this can be understood as a clear example of FlexLink economizing on innovation by trying to relate actors beyond relational boundaries to help explore their resource versatilities further. The resource versatilities in question were those related to IM3's manufacturing resources that were potentially related to the quality problem.

In another example, FlexLink had frequent interactions with PR1 and PR2, which supplied plastic raw materials to IM2 and IM4. Every now and then, FlexLink engineers met with salespersons from PR1 and PR2 to learn about their new products and new opportunities for combining those resources with FlexLink's product designs, as well as IM2's and IM4's products. In addition, the new combination potentials were sometimes offered to FlexLink by PR1 or PR2, based on the knowledge those sub-suppliers had gained of FlexLink's products and processes. The learning on all sides of those relationships (between FlexLink, IM2, IM4, PR1, and PR2) regarding each other's resource use and products was a primary driver of the new products and solutions that these firms developed together over time. FlexLink, by accessing the resources of PR1 and PR2, was empowered to develop new products with IM2 and IM4. In doing so, new product designs of FlexLink were combined with new combinations of the resources of IM2 or IM4 and PR1 or PR2. This became possible by relating actors across the relationships of FlexLink with each of the four firms. Every time a new product was developed in this way, FlexLink's economizing on innovation by relating those actors showed its value; the key to innovation became accessing new capabilities of PR1 or PR2 and using them to expand the relationships with IM2 and IM4 through joint product development.

Furthermore, firms can economize on innovation to solve different kinds of problems by connecting relationships. Solving a problem across multiple relationships requires relating actors across those relationships. Whatever solution is reached will have different meanings for the different actors involved, in terms of how to continue working. Each actor affects the other actors that it is related to by providing its input on the processes of solving problems.

Collaborating and exchanging knowledge across relationships can bring benefits derived from an actor's contributions toward solving a problem. Within one's supply network, a problem is tackled by certain actors, and those actors solve the problem in a certain way with regard to their own contexts, and the context of the contributor would be more likely to affect the solution. For example, FlexLink's plastic injection-molding tools are manufactured by TM1 and TM2. Frequently, the quality problems affecting FlexLink's products are related to the tools the suppliers use for manufacturing them. Hence, FlexLink finds it important to connect with TM1 and TM2 directly, and relate actors across those relationships and its relationships with the injection-molding suppliers. FlexLink ensures that its design engineers, the supply chain group, and the product quality engineers closely collaborate with TM1 and TM2 when it comes to developing new products or solving different technical problems of their products. Generally, this collaboration also involves the production engineers of the injection-molding suppliers. Without

relating those actors, various versatilities of the resources of all of the firms involved would remain unexplored. It is the interactions among actors across those relationships that make it possible for buyers and suppliers to come up with innovative ideas that require a wide range of knowledge and operational expertise. Figure 6-15 illustrates this form of economizing on innovation.

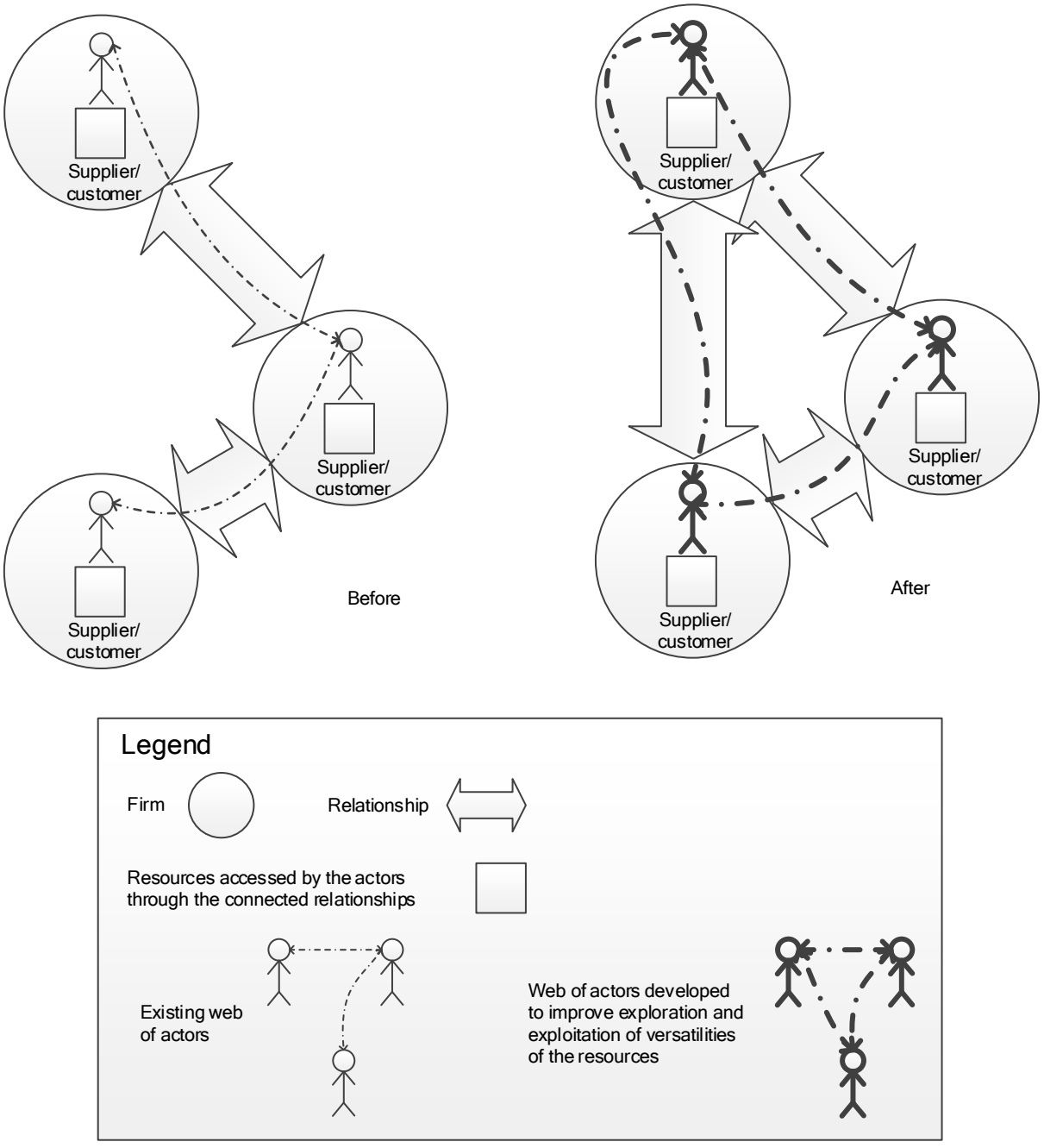


Figure 6-15: Economizing on innovation across connected relationships by relating in the web of actors

7 Economizing on supply network development

The aim of this study is to develop a framework for analyzing how a firm economizes on supply network development, and to develop an understanding of supply network development from a firm's perspective. In order to reach this aim, a case of developing the supply network of a specific buying firm – namely, FlexLink – was studied. The case comprises a variety of developments that the buying firm has made in relation to its supply network over a period of 13 years. Each of those developments was analyzed in terms of how it contributed to the buying firm's path towards gaining different types of economic benefit. In essence, the buying firm's efforts in developing its supply network were analyzed in order to conceptualize a development in terms of the dimensions that determine how it makes economic sense for the firm.

The starting point for the analysis was the three types of economies discussed by Håkansson and Persson (2004) – economies of scale and scope, economies of integration, and economies of innovation – and the result was the identification of three dimensions for economizing in supply networks, which are focus, direction, and scope. Industrial networks are composed of actors that utilize resources to undertake activities. Within any given relationship, bonds, ties, and links connect the actors, resources, and activities respectively, and on a network level, this connectedness can be captured through an array of actor webs, resource constellations, and activity patterns. In a supply network, through this relatedness, actors interact, resources are adapted to each other, and the undertaking of activities is adjusted accordingly.

Development of a supply network can hence be understood as the development of the relatedness among the actors, resources, and activities involved, with regard to how they interact, are adapted, and are adjusted, respectively. This understanding relies on a principal assumption, that no development takes place in isolation, and that developments of a business network include the development of its actor, activity, and resource dimensions in relation to each other. Three research questions have been posed, aimed at identifying how such developments can be analyzed and theorized with regard to the three types of economies identified in earlier IMP studies, i.e. economies of scale and scope, integration, and innovation.

This study has been an attempt to understand how a firm's development of its supply network can be understood as different types of economizing, and the problem discussion pointed at the pair-wise logic of conceptualizing economizing as a way to understand a firm's developments in its supply network. The analysis in chapter 5 dealt with various developments in FlexLink's supply network over a 13-year time period, and presented various situations in which each of the three types of economies became achievable as a result of developments of the relatedness between actors, resources, and activities in FlexLink's supply network. Chapter 6 built on the analysis in chapter 5, and tried to identify dimensions for analyzing economizing in a supply network. As a result of that discussion, the following section gives an overview of the analytical framework developed in this study, which was presented in more depth in chapter 6. Next, the dynamics of economizing on supply network development are discussed by putting the developed framework into perspective in relation to network effects and relativity in networks, and that is followed by implications of the findings for managerial practice, future research, and research method.

7.1 A FRAMEWORK FOR ANALYSIS OF ECONOMIZING ON SUPPLY NETWORK DEVELOPMENT

The starting point in this conceptualization of economizing on supply network development is the pair-wise analysis logic described in section 2.5. According to that logic, to understand economizing on supply network development, each development is first analytically divided into *"changes"* that can be analyzed in terms of the network layers.

To understand a development in a firm's supply network, each change that constitutes the developments is analyzed in terms of what it means in each of the network layers. In this study, a change is defined as a part of a development, which relates to two network layers, the layer that changes, and the layer in which the change is expected to achieve economies. By analyzing which layers the change affects and targets, the type of economic sense it makes for the firm can be understood. Changes in the resource and activity layers can be understood as economizing on scale and scope, in the activity and actor layers as economizing on integration, and in the actor and resource layers as economizing on innovation. To understand a development in a firm's supply network in terms of economizing, it is also important to analyze whether the change impacts elements in a relationship or is enabled by connecting relationships to each other. Since each development may affect all three layers of the network, this decomposition of each development into changes is necessary in order to analyze its impacts on pairs of network layers.

This conceptualization is performed by differentiating between three dimensions of each of the three types of economizing. A firm can approach each type of economizing by concentrating on a development in its supply network on one side of the pair of network dimensions that constitute it (the *"focus"*), with the goal of gaining benefits from changing one of the central features of the other side (known as the *"direction"*) and having a *"scope"* with which it is primarily concerned (see Figure 7-1).

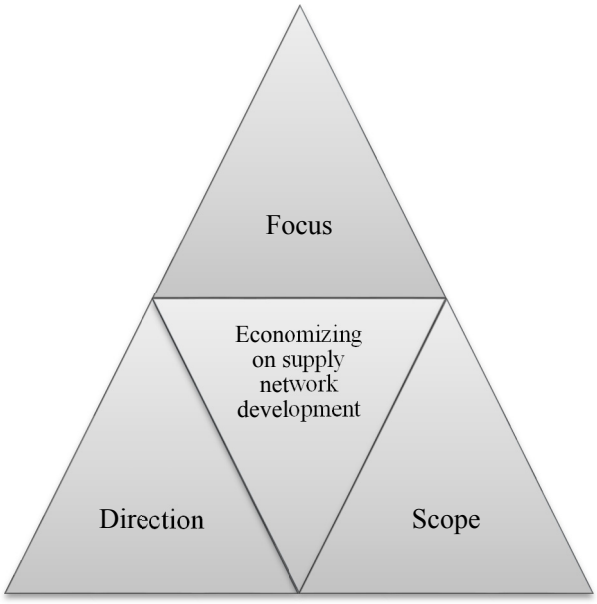


Figure 7-1: Dimensions of economizing in supply networks

The first dimension is the "focus" of the change. A firm's development of its supply network includes developing the activities, resources, and actors involved in it, as well as the

interconnections between those elements. By drawing analytical boundaries around developments that a firm makes in its supply network over time and space, each development can be analyzed as a set of changes to the network elements.

To analyze each change, the first step is to identify which network layer is being changed. Because in isolation the acting of actors, the activation of resources, and the undertaking of activities lose meaning, when conceptualizing the focus of a change, the interrelatedness of these network elements is considered as the focus. Each change can be analyzed in terms of the interrelatedness on the network layer being changed, and this defines the focus of the change. Focus is the network dimension being fine-tuned in the change; it can be a resource and its connections with other resources, an activity and its connections with other activities, or an actor and its connections with other actors.

Actors, resources, and activities work in relation to each other; all resources are utilized by actors to undertake activities, all actors utilize resources to undertake activities, and all activities are undertaken by actors utilizing resources. Hence, a change in one network layer is defined in this study in such a way that it is likely to achieve something in another layer. To grasp this, each change is analyzed in relation to the two network layers that it concerns. If one is the layer the change focuses on, the other is the layer in which the change aims to achieve an improved state. This defines the second dimension of economizing, the "direction" toward which each change is made. Changes can be directed at any of the six following directions for improvements in the supply network: undertaking of similar activities, coordination of sequential activities, utilization of capacity of resources, exploration of resource versatilities, co-evolution of actors, and jointness among actors.

Within a firm's supply network, several opportunities for developing and gaining economies may exist in each supplier relationship. However, development opportunities are not limited to individual relationships. Firms can also develop various opportunities across their business relationships in order to achieve different economies. This is grasped with the third dimension of economizing on supply network development, known as the "scope" of the change. The scope dimension adds further depth to the conceptualization of economizing, differentiating between the changes that are of a relational nature, and those that connect business relationships. The latter type of changes aims for what can be achieved beyond individual relationships when firms invest in the connections among their relationships. When the scope is relational in nature, the focus of a development can be on changing activity links, resource ties, or actor bonds. When the scope is inter-relational, the focus of a development is on making changes to network elements by connecting relationships to each other. Therefore, an inter-relational change is conceptualized as a change that has a wider focus than individual links, ties or webs, a change that takes place in activity patterns, resource constellations, and actor webs.

When the three dimensions of focus, scope, and direction for a development are analyzed, the development can be understood in terms of economizing; in other words, the way it makes economic sense. This study aims to understand developments in a firm's supply network by studying their processes. The process of a firm taking part in developing its supply network can be divided into analyzable parts – changes – where each change is studied with regard to what is

being changed (the focus), the possible direct outcome of it (the direction), and whether or not it encompasses connections between relationships – the scope.

To divide a development into changes, it is important to analytically define a change so that it can be characterized by one focus, one scope, and one direction. Figure 7-2 illustrates the framework developed in this study, where diamonds show focuses and scopes of change, single-headed dashed arrows show directions of change, and double-headed arrows show types of economizing on supply network development. As shown in the figure, each layer of a supply network (focus and scope) can be changed in different ways (directions). It is the combination of these dimensions of a change that define how the change makes economic sense.

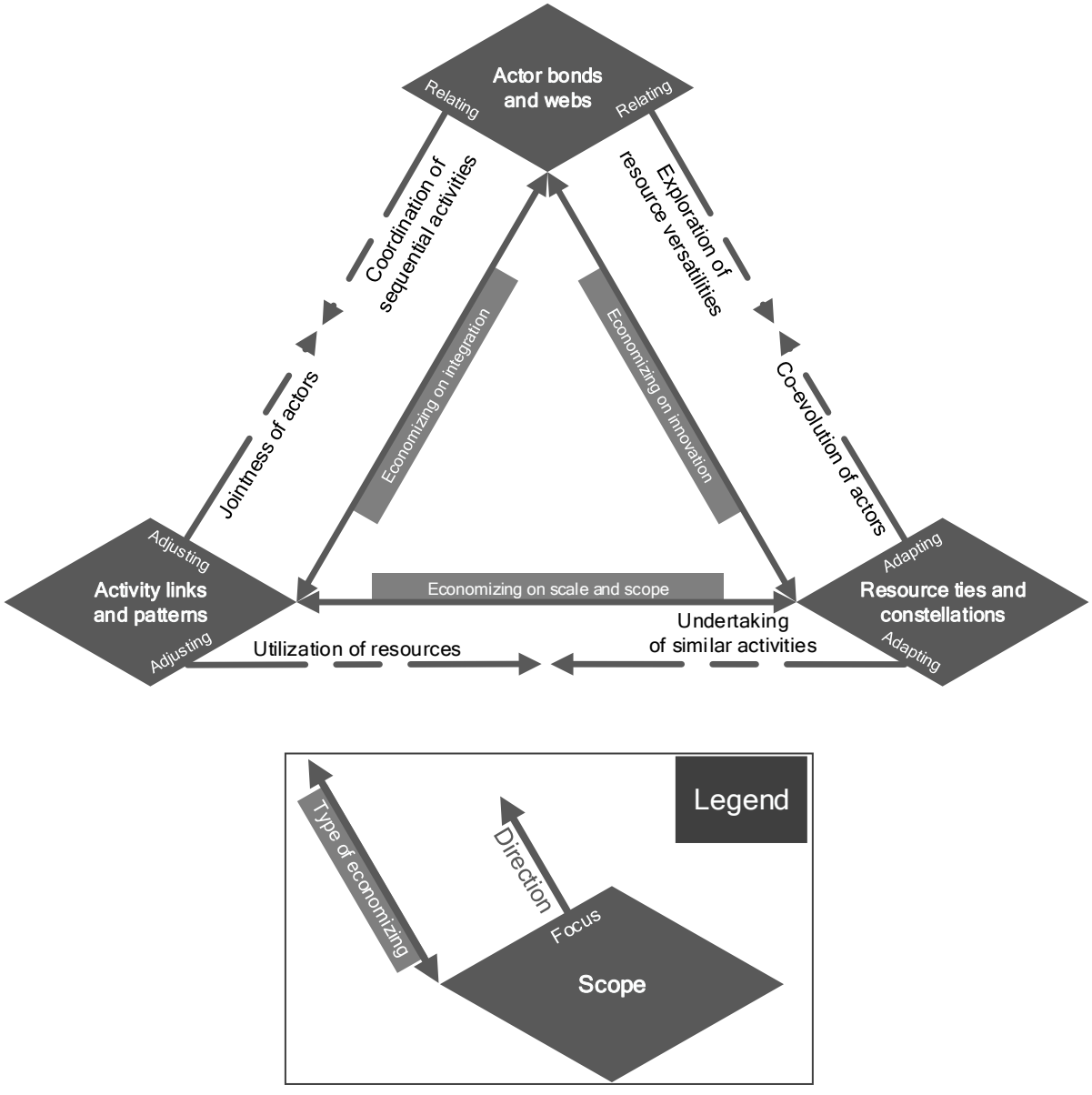


Figure 7-2: A framework for analyzing economizing on supply network development

The paragraphs above discuss economizing as a concept that can help one to understand developments in a firm's supply network from the firm's perspective. In that conceptualization, it is important to consider that it is never only one firm that develops its supply network. A development in a firm's supply network is a result of all the firms' efforts in economizing with

different focuses, in different directions, and with different scopes. Hence, based on this study, a firm's economizing on supply network development is contributing to developments in order to achieve certain economic benefits or to avoid certain economic losses in the short or long run. A more detailed discussion regarding this issue is provided in section 7.2 below.

In his seminal work, Williamson (1985) proposed a need for linking the structural features of different organizational forms with their economic consequences. His major attempt at taking a first step in doing so was built on addressing a long-neglected component of economic analysis, the transaction cost. By developing the notion of transaction costs[18] (Coase, 1937) as the economic equivalent of what physicists call friction, Williamson brought to attention a major flaw in the economic analysis models of the time[19] – these models relied on costs of production as the main identifier of how the business world is organized, and problematized economic organization as a matter of the cost of contracting. This was a move towards further mathematizing the field of economics, by *"bringing institutions more prominently into the picture"* (Williamson, 1985:386).

Williamson (1979) replaced transaction costs with cost economizing as the main criterion defining how dealings between companies is organized. That view relies on the assumption that the business world is organized in terms of the three forms of market governance, trilateral governance and relational governance (the latter form consisting of two forms). The first form of relational governance is unified governance, which applies to cases in which recurrent idiosyncratic investments are needed, and indicates primarily vertical integration. The second form of relational governance applies in situations where recurrent mixed investments are needed, which are controlled through an exceptional special form of bilateral governance. Hence, in Williamson's view of the business world, relationships are nothing more than exceptional situations, and interactions barely exist.

Intriguingly, Williamson (1985:386) cited John R. Hicks' (1976:208) famous quote to assess the appropriateness of transaction cost economics in addressing important issues in economic analysis: *"a theory which illuminates the right things now may illuminate the wrong things another time. [Accordingly], there is ... no economic theory which will do for us everything we want all the time ... We may [someday] reject our present theories not because they are wrong, but* ***because they have become inappropriate.****"*[20] Although Williamson's efforts in giving economics a more institutional character constitute an important step towards greater understanding of the organization of the business world, such a view of economizing in the business world seems inappropriate to enhance understanding of how a firm's developments on its supply side can make economic sense. This is due to two major reasons that are important motivations for a need for a new conceptualization of economizing based on interaction in networks, which are discussed below.

Firstly, it is not only costs that determine the organizing of the industry. In an early observation, Blois (1971) accentuated the benefits that can be achieved when firms deal with their major counterparts, and the role of those benefits in shaping the vertical quasi-integration form of

[18] This is defined as the costs of running the economic system
[19] Neoclassical economics
[20] Quote and the punctuation marks are taken directly from WILLIAMSON, O. E. 1985. *The economic institutions of capitalism,* New York, The Free Press., with bold emphasis added by the author of this thesis.

organization, a form that Blois does not identify as rare or exceptional. It is fair to recognize that Williamson's (1985) conceptualization of the logic behind the organization of the business world also recognizes the important role of certain benefits, such as economies of scale and scope, economies of speed, and economies of specialization. However, an interactive view of the business world presents a different image of the costs and benefits of interacting on the supply side of a firm that is more relevant to the phenomenon of supply network development.

Secondly, the developments observed in inter-organizational phenomena in recent decades indicate the increasing importance of the role of the supply side of firms in the firms' ability to develop and reap benefits. In such observations, relationships and connected relationships do not seem exceptional forms of governance: Rather, those relationships are so important for firms that the world in and around a firm needs to be characterized by the firm's embeddedness in those relationships (Håkansson and Ford, 2002), by the extent to which all elements "inside" a firm are interconnected with elements "outside" it (Araujo et al., 2003; Dubois, 1998), and by the blurriness of boundaries (Håkansson, 1982) between firms. Organizations are so interdependent that determining what resource is controlled by which firm is more a matter of analysis than practice (ibid.). The framework presented in this thesis is built on an interactive approach, and the understanding that the framework tries to develop of a firm's developments on the supply side is presented in terms of economic sense-making of changes to the interconnectedness of actors, resources, and activities inside and outside the firm.

In this study, the developed framework approaches supply network development with an emphasis on the interactive, dynamic, and interconnected nature of the business world. In this framework, costs and benefits are conceptualized together in terms of three categories of ways that a development can make economic sense: economies of scale and scope, economies of integration, and economies of innovation (Håkansson and Persson, 2004). A key consideration that the framework highlights is that the variety of costs incurred by a firm's supplier relationships are not only wider than simply the production costs and the transaction costs, but also their benefits can be much broader than mere cost-saving opportunities.

There are numerous positive gains that buyers and suppliers can achieve only when they are in a relationship with each other. No two relationships of a firm work alike; a firm can simultaneously have relationships with different levels of involvement, with different business volumes exchanged, with different levels of continuity from the short to long term, and combined with different sourcing policies (Gadde and Snehota, 2000). Therefore, each relationship of a firm has its own functionalities and economic consequences for the firm; developing supplier relationships and connections between relationships can be an important source of opportunities for firms.

Here, economizing is conceptualized in line with Håkansson et al.'s (2013) understanding of economizing, which is based on two fundamental assumptions – the heterogeneity of resources, actors, and activities, and the experiential nature of knowledge. This way of understanding economizing deals primarily with generating economic value, rather than the cost minimization that is the focus of it when used in transaction cost economics. By emphasizing the interactive nature of the inter-organizational phenomenon at hand, the framework is designed to explain what can be achieved through different forms of collaboration between firms with regard to how their actors relate to each other, how their resources are adapted to each other, and how their activities

are adjusted to each other. In essence, this framework contributes to answering Håkansson et al.'s (2013) call for a conceptualization of *"the interactive economic man."* An important reason why this framework can provide a conceptualization of economizing that relies on interaction is its consistency with Weick's (1995) concept of sense-making. This concept is elaborated further in sub-section 7.4.1, where this area is cited as a potential track for future research.

7.2 DYNAMICS OF ECONOMIZING ON SUPPLY NETWORK DEVELOPMENT

7.2.1 RELATIVITY IN ECONOMIZING ON SUPPLY NETWORK DEVELOPMENT

An interactive world is relative. No resource is utilized in isolation. Each resource of an actor is combined with resources of each of the other actors in a unique way (Ford and Håkansson, 2006). This means that the value of a resource can only be understood in relation to other resources, and in terms of how all of those resources are combined (Håkansson and Waluszewski, 2002). It is the interaction between actors that establishes how their resources are combined and recombined, and therefore how the interdependencies across their boundaries are developed. In this sense, capabilities are more a characteristic of relationships than a characteristic of firms. Furthermore, interactions between actors do not take place in isolation. To understand an interaction between two entities, an understanding of the other interactions that relate to it is also needed.

In line with Ford and Håkansson (2006), this study highlights two issues in relation to relativity in economizing on supply network development. The first issue deals with the fact that interactions are multifaceted. It is not possible to prescribe one interaction as "the" appropriate interaction. Appropriateness of interactions may differ in different situations, for one party in relation to different parties, at different times, and with different time horizons. Relativity is central to supply network development; it underscores the importance of changes outside the scope of a change. The scope dimension of economizing on supply network development concerns whether a development focuses on the network elements and their relatedness within a relationship, or concerns developments across multiple connected relationships. Accordingly, to make economic sense in a certain way, a given change may focus on a supplier relationship, while several different forms of economic sense can be made of taking an inter-relational scope, making changes to actors, resources, and activities that are connected to each other across multiple relationships. The scope of a development can be multifaceted, and the way a development makes economic sense can be different when other facets of the scope dimension are taken into consideration.

For example, in a buyer-supplier relationship, at a certain point in time, a particular adjustment of activities towards increased utilization of a particular resource may be a means of gaining economies of scale and scope for both parties. However, when considered from the perspective of multiple connected relationships, the economic sense-making of that development may become more complicated.

It may be the case that increased utilization of a resource in one relationship is only possible when decreasing the utilization of another. In the process of that development, both firms may adjust their focal activities so that the activities can utilize the focal resource. In such a case, the focal activities are said to have sequential interdependence with activities of other actors in the other relationships that are connected to the focal relationship. Those activity adjustments may cause problems for the coordination of those sequentially interdependent activities, because the focal

activities are changed and have to be adjusted again alongside the latter group of activities, and hence hinder the firms' efforts in economizing on integration. This means that an attempt towards economizing with a particular focus, direction, and scope can possibly create what can be called "diseconomies" when a different focus, direction, and scope is taken.

For each actor, determining how to interact with other actors in a certain situation depends on how each actor views its position in relation to the other actors surrounding it in the network. To cope with such relative interdependencies, and in order to survive and succeed, actors may seek stability. However, that stability does not prevail over time, and interdependencies change in different directions depending on how actors, resources, and activities of firms interact. Those changes of directions reinforce relativity.

As discussed above, each change can be analyzed in terms of its focus, direction, and scope. The focus of each change shows which resource elements – and their connectedness – are being changed. When, for example, certain resources and their ties are the focus of the change, the features and ties of those resources will be different after the change. The changed resources may still have important ties with other resources, which may need to be reconsidered. At the same time, the new resource features and ties can represent new opportunities for resource recombining and, thus, new possibilities for economizing. This way of reinforcing relativity can also be seen in the other two network layers, and in the connections between them.

In line with Ford and Håkansson (2006), the issue addressed in this section points at an important dynamic feature of the business world. As two firms get closer to each other by adapting to one another, they may be moving away from their other counterparts. In addition, those counterparts are moving towards other counterparts, and this creates a "moving world." Developments in supply networks constantly take place in interactions between firms and the network elements that characterize them. By economizing on one direction and towards a certain other firm, each of the two firms may lose other opportunities for achieving economies. Furthermore, economizing in one way in a relationship may result in diseconomies in another relationship of the firm. In the previous chapter, various examples were discussed in which a firm's economizing on particular developments in one relationship undermined developments in certain other relationships; for example, consolidation of supplies.

The ways firms economize on a particular development may also differ. For example, in a buyer-supplier relationship, from the buying firm's perspective developing particular new products in collaboration with the supplier may serve to exploit the versatilities of the resources of the two firms further. Simultaneously, when seen from the supplier's perspective, this may be a way to economize on scale and scope in their relationship with a raw-material supplier. This same development may be viewed by the supplier in terms of particular diseconomies that it brings in relation to the other customers of the supplier; it may be the case that the supplier does not have the resource capacity required to serve all of its customers, and hence some of its customer relationships may suffer. All firms continually economize and affect the developments in the business networks surrounding them. Hence, from a firm's perspective, the question of "what can be achieved by each direction of development" should be answered by taking into consideration the focal firm's interdependencies with the other firms.

7.2.2 NETWORK EFFECTS OF ECONOMIZING ON SUPPLY NETWORK DEVELOPMENT

The intent of the discussion above is to show how motivations for and outcomes of each development are relative to the rest of the developments in the network – to emphasize that developments affect each other. The framework presented in this study aims at providing a way to view and to understand the processes and effects of these developments; in other words, the firms' efforts to economize in the network. This framework can also be used to analyze how each development affects the others in terms of the network effects of economizing on supply network development.

According to Waluszewski (2006), occurrence of network processes is not limited to network structures; such processes have also been observed in hierarchical and market-like structures. In the IMP tradition, the networking processes are highlighted, rather than network structures. Various studies have emphasized the importance of this by underscoring interaction and its economic value for firms. Among them, Waluszewski (2006) emphasizes interaction by combining resources across company boundaries. This poses an open question in this regard: Are there self-regulating mechanisms running these networking processes, such as those assumed in the traditional market model?

A good starting point for this study to answer that question is Ford and Håkansson's (2006:4) proposition that business activity is neither completely controlled by a single firm and what that firm aims to achieve, nor a result of the aggregation of multiple firms to reach a certain goal towards some *"generalized other, such as a market of customers or suppliers."* Instead, firms and their resources, problems, and ambitions are heterogeneous, and business activity can only be understood by studying the interaction between how each firm interprets the resources, problems, and ambitions of its own and the corresponding interpretations of the other firms surrounding it.

In this study, it has been shown that developments in business networks are results of the ambitions of the firms involved for gaining different economies. Assuming "one development" in a business network, that development can be broken down into changes and analyzed in terms of its focus, scope, and direction dimensions. The focuses, scopes, and directions of the changes constituting that development are relative to the actors, resources, and activities of each firm involved in that development. The development may be shaped by multiple firms through their joint efforts, and may affect multiple firms that contribute to making the development happen. Even if, for instance, the buying firm considers itself to be in complete control of the initiative and process of the development, the interrelatedness of the actors, resources, and activities across the firm's direct and indirect relationships with suppliers, whether inside or outside the scope of the development, will affect it in one way or another.

If investigated deeply enough, all developments can be found to stem from somewhere in the network (Håkansson and Ford, 2002), but it is impossible to identify a single firm or a single initiative solely behind a development. Developments in a firm's supply network can be inspired by many things happening in the network – from issues such as a change in the attitude of a supplier towards the buying firm or a quality problem with a product that a supplier manufactures for the buying firm, to major events such as an opportunity to enter a new sales area, or a new paradigm sweeping the world of managerial practices.

The same argument also applies to understanding the processes of developments. All actors, resources, and activities are interrelated in a firm's supply network. Developing one of these elements in the network activates changes in the bonds, ties, or links to that element in each of the relationships where the element is involved. Due to the direct or indirect interrelatedness of such elements across multiple relationships, the change activates further changes in the actor webs, resource constellations, and activity patterns surrounding the focal element subject to development. Multiple firms become directly or indirectly involved in any development that a firm decides to make. In other words, each development in a firm's supply network is a collection, and a result of the interaction of contributions from multiple parties that are in one way or another being affected by the development. Each of those firms that contributes to the development may do so with particular economies in mind, which may or may not be similar to what the other firms involved expect from the development. To gain those economies, the firms involved may attempt to influence the development's focus, scope, and/or direction.

It is the interaction – in its rather general definition, among actors, resources, and activities of those firms – that defines how a business network develops over time. Hence, the "invisible hand" metaphor cannot explain how a business network develops, and neither can individual action be found to govern change. The interaction process among actors, resources, and activities of multiple firms, each with different economies in mind, will determine the characteristics of each development. This raises an important question with regard to the concept of economizing put forth to understand supply network development from a firm's perspective: Is it expected outcomes (or the direction) that determine the means (or the focus and scope) a firm undertakes in contributing to developing its supply network, or it is the means and available options that determine the outcomes the firm may choose to pursue? The paragraphs below are an attempt to approach this question by discussing the developed concept in relation to the processes of effectuation and causation (Sarasvathy, 2001).

Economizing, as conceptualized in this thesis to capture developments in a firm's supply network, can be considered as an interplay between effectuation and causation processes that are primarily "means-dependent," but are also, to some extent, "effect-dependent." According to Saravathy (2001:245), *"causation processes take a particular effect as given and focus on selecting between means to create that effect [, while] effectuation processes take a set of means as given and focus on selecting between possible effects that can be created with that set of means."* In an effectuation process, the effect is determined by the actor and its ability to exploit contingencies. When economizing in a supply network, the interrelatedness of the actors, activities, and resources in the network (inside and outside the buying firm's boundaries) are changed to exploit opportunities that are made accessible by such interrelatedness. In this respect, the interrelatedness is the means and those opportunities are the effect. At the same time, which opportunities a firm can exploit with each development are defined by how the firm is positioned in the network, or in other words, how its actors, resources, and activities are interrelated with those of others in the network.

Two important consequences of conceptualizing economizing on supply network development as an interplay between effectuation and causation process can be identified. Firstly, economizing is conceptualized as a process, rather than as a structural aspect of networks. The focus on *"economizing on"* rather than *"economies of"* in the thesis is intended to highlight the process nature of economizing in line with the key aspect of the IMP tradition, the emphasis on processes

rather than structures. Secondly, studying the concept of economizing does not rely on the predefined intentions of the practitioners involved in developing their supply networks. Goals that are set when developing a supply network are rather emergent and problem-driven; the nature of supply network development decisions are more likely to be "evolving" by making choices among emerging opportunities, rather than "creating." In this endeavor, it is the firm's embeddedness in the network that sets the conditions for determining which opportunities for economizing the firm can opt for at each point in time, and in relation to each part of its network.

Nevertheless, economizing is not always achieved by making a change; sometimes avoiding a change can also be a source of certain economic benefits. The interrelatedness among actors, resources, and activities in a supply network, at the same time as it is a platform for dynamism and change in the network, facilitates the persistence of the way network elements are interrelated. The investments firms make in relating actors, adapting resources, and adjusting activities need to be returned, and that calls for some degree of stability. Waluszewski (2006:80) refers to the concept of "economic nepotism" as *"a friction force that will favor the main part of already existing economic resources."* This friction force exists in every instance of supply network development, because there are economies in continuing the work as it is. In agency theory, these economies are referred to as *"economies of continuation"* or the shadow of the future, which are the possibilities for reaping economic benefit from improved operational efficiency, better cooperation, less need for monitoring, and potential for long-term benefits between a buyer and a supplier (Heide and Miner, 1992; Jacobides and Croson, 2001). Hence, as each development can provide several economic benefits, avoiding a change may bring particular economic benefits, too.

7.3 MANAGERIAL IMPLICATIONS

All firms are involved in industrial networks, where all of their operations, products, machinery, business units, engineers, managers, and knowledge are interrelated and develop over time. Being engaged in such dynamic and interconnected environments is a source of both opportunities and limitations for firms. This study focused on the developments in the supply network of a firm, and suggested a framework for analyzing how such developments can make economic sense to the firm from whose perspective the supply network is viewed. In addition, it was discussed that developments in a firm's supply network result from the actions and reactions of various firms involved in connected relationships. Hence, to understand how a development in a firm's supply network can make economic sense to the firm, it is necessary to look into how the firms are connected to each other and the different aspects of their connectedness. The framework developed in this study suggests analyzing each development in terms of its focus, direction, and scope. The managerial implications suggested below are based on those dimensions of developments, as well as on how having an awareness of and trying to actively work with those dimensions can improve managerial practices of strategizing for dealing with developments in a firm's supply network.

7.3.1 THE FOCUS IN A DEVELOPMENT

At the core of the current study lies the argument that developments in a firm's supply network cannot be analyzed simply by comparing costs and benefits. Even the most thorough models for probing the smallest cost details are inappropriate when it comes to analyzing the economic logic behind a firm's supply network, because the developments in a firm's supply network can be driven by logics for which quantification in monetary terms may not necessarily be possible nor desirable.

In this study, the economic logics driving developments in a firm's supply network are conceptualized in terms of three forms: economies of scale and scope, economies of integration, and economies of innovation. The attempts of firms to gain different economic benefits from such developments are analyzed in terms of the firms' economizing on those three forms of economies. This perspective on supply network development provides an alternative way of viewing the economic logic behind strategic action, a perspective that explains why firms make certain changes not based on monetary analysis of costs and benefits, yet incorporates the firm's perception of costs and benefits with regard to how different elements are interrelated in the network. By adopting this perspective, new explanations for strategic action are revealed. In addition, equipping decision-makers with this perspective enables them to re-evaluate their strategic actions towards developing their supply networks and their reactions regarding how their firms' counterparts impact developments in their supply networks.

The focus of a development affects the efforts the firm dedicates to a development, and the direction determines what can be achieved from the development. This can provide a foundation for performing an alternative investment analysis, where the efforts needed to make a development are analyzed based on the changes required in the activities, resources, and actors of the firm and of the other firms involved. Analyzing the focus dimension yielded the most important managerial implication of the study, that developments in a firm's supply network never take place in isolation. For example, developing a supplier's machinery is in relation to a product or another machine of a customer or a sub-supplier; a change in a production activity a supplier undertakes relates to the other activities the supplier undertakes for its different customers; and the development of the knowledge of a firm's engineers is related to which engineers of the suppliers, sub-suppliers or other firms they interact with, and how they interact with them.

Hence, instead of analyzing how each element is developed in the network, a promising way to analyze developments in a firm's supply network is to analyze how the relatedness between the different elements in the network is developed. In this study, developments in a firm's supply network were defined and analyzed in terms of changes in that interrelatedness. In other words, when considering whether a particular development is worth investing in or not, managers should not only consider which elements of the network they are developing, but should also reflect on which other elements in the network are affected by the development due to their interrelatedness with the network elements they are focusing on developing. This way, for example, whether developing a new product, buying a new machine for manufacturing operations, changing the manufacturing process of a product, or even changing the amount of a purchase order sent to a supplier, each of these can be considered as the start of a chain of changes taking place in the network. Any analysis of the costs and efforts of making those developments requires a perspective wider than what might be indicated by the costs that the focal firm initially expects to incur. By considering the changes that a development entails in the network, a more relevant analysis of the development – as well as a more realistic assessment of the costs – can be achieved.

To do so, managers need to work with their understanding of the supply network: How is the firm, its resources, and its activities related to the other firms in the network, especially with regard to the development in focus? Answering this question is critical for making economic sense of the development. Every firm has an understanding of the network surrounding it and the interrelatedness of its elements, called their "network picture," which is needed for making sense

of and triggering managerial actions (Colville and Pye, 2010). That understanding can be used to answer this question, but it is not enough; it is also important to see how the suppliers and the other important counterparts view the network. A buying firm's understanding of its key suppliers' views of the network may not be as up-to-date, correct, comprehensive, or detailed as the pictures the suppliers draw of the network (Holmen et al., 2013). It is through interaction with the suppliers, the sub-suppliers, the suppliers' customers, and the other actors in the network that the buying firm can gain a better understanding of how a given development can affect its supply network.

7.3.2 THE FOCUS AND DIRECTION IN A DEVELOPMENT

By developing the way elements are interrelated in a supply network, firms can expect different benefits. The benefits that can be achieved by a development are analyzed in terms of which of the six characteristics are to be improved by the development in the firm's supply network. As discussed in section 7.2, developments in a firm's supply network impact and result from each other; all developments produce conditions and opportunities for further developments and earn different economic benefits by making those developments. Alertness to such economic opportunities (Kirzner, 1973) and making the most of them is critical in economizing on developments in the supply network of the firm. In the end, it is the ability of the decision-makers to detect and exploit different kinds of opportunities that determines this alertness. Such opportunities, in the view of the framework presented in this thesis, are analyzed in terms of the directions that a firm's economizing on a development can take.

Benefits that a development can generate in terms of economies of scale and scope can be achieved either through increased utilization of a resource or increased undertaking of operations that can utilize the same resource. To produce benefits in those directions, the development needs to focus either on making changes to the interrelatedness of operations that require the same resource, or to the interrelatedness among resources that undertake the focal activities. For example, to economize on scale and scope, a buying firm can increase the volume of a purchase order sent to a supplier, or send purchase orders to the supplier for other products whose production requires the same resources of the supplier. The buying firm can increase batch sizes of the product it orders, or increase the frequency of its orders. To achieve an increased undertaking of operations with similarities in utilization of resources, a development can focus on changing the features of a machine utilized for manufacturing a certain product. This can change the features of the machine in a way that increases its capacity or enables the machine to be operated differently than before.

To economize on integration, the efforts of firms can be focused on changing the way actors (such as engineers, managers, business units, etc.) of the firms involved are related to each other, with the goal to improve the coordination of different operations between them. Various barriers can stand in the way of achieving more efficient cooperation between the actors of two or more firms, and a development can focus on removing such barriers that hinder the coordination of activities. Take the example of a buying firm that establishes a connection to a sub-supplier and initiates interactions among actors in the two firms in relation to its supplier. If this new interaction pattern serves to help the three parties better coordinate their production schedules and inventory plans, then the buying firm has economized on integration.

Alternatively, economies of integration can be achieved by developing how activities are interrelated, which can produce improved opportunities for cooperation among actors with regard

to the activities they undertake. Of the various strategies available, rearranging activities is perhaps the most common way to economize on integration with this focus and direction. Activities are all interrelated, and the way they are arranged and undertaken in relation to each other has important implications for the economies of integration that can be expected from them. By rearranging activities and making their execution more efficient, firms can benefit from economies of integration. For example, investing in a supplier's ability to eliminate a sub-supplier of certain operations can rearrange the activities such that the focal operation can be coordinated more easily with the other activities of the supplier; when these operations are instead undertaken by the supplier, they can be scheduled and planned for with increased control. The buyer and the supplier can then become closer in terms of mutual investments, find more issues to discuss, and increase opportunities for interaction. In addition, coordination of activities between two or more firms is constantly affected by events that are outsider to the relationships between them. Investing in short term compromises by one party to help the other in difficult situations can result in economies of integration.

Firms can economize on innovation either by developing the interrelatedness among their resources or their actors. By recombining resources that are already being utilized, and using them in unexplored ways in relation to each other, actors evolve together. An example involves changing the design of a product created by the engineers of the buying firm and manufactured by the production engineers of the supplier using its machinery, by modifying the production machinery of the supplier. Even without this recombining of resources, the actors on both sides of the relationship (the buying firm's and the supplier's engineers) would continually be evolving, since this is the nature of every element of the network. However, this recombination of resources enables these actors to evolve together and learn how to better work with each other. In addition, the search for opportunities to recombine resources can be extended to resources that have not previously been explored. This approach has the specific advantage of contributing to the actors' co-evolution, by compelling them to learn about and work with new resources, and opening new doors of cooperation in their relationship.

Furthermore, firms can economize on innovation by developing the way actors are related to each other across relationships. One way to do this is to strengthen the relatedness among actors, in order to enable the actors to explore new potentials of the resources they control. Investing in increasing collaboration among actors in a buyer-supplier relationship, for example for new product development, can result in managing a product development project jointly between firms, thereby making the most of the resources of the firms involved. The design of the product, its production, and assembly can then be completed more efficiently, because synergies arise from heightened collaboration between the actors. Likewise, knowledge sharing is a way to gain economies of innovation in several ways – by proactively teaching a supplier about a technique, helping a supplier solve a technical problem, learning from a supplier about a certain technology, learning from a sub-supplier about a new opportunity for new product development with a supplier, or through numerous other forms of teaching, learning, or joint learning.

7.3.3 THE FOCUS, DIRECTION, AND SCOPE IN A DEVELOPMENT

In traditional models, such as Porter's (1980) five forces, the firm's counterparts are viewed as threats to the firm, therefore giving value to controlling them and avoiding dependence on them. According to Baraldi et al. (2007), in conventional approaches to strategy, strategy consists of

allocating "known and controlled" resources to achieve predefined goals, and a clear distinction is made between a firm and its environment. In contrast, the IMP tradition highlights the inevitable interdependence among firms in industrial networks, and emphasizes the value of cooperating with the counterparts in the network (Gadde et al., 2003), because no firm fully controls its resources (Araujo et al., 1999). In line with Johanson and Mattsson (1992), in this study "strategic action" is understood as the firm's attempts to influence the way it is related to the other firms in the network. Hence, the way strategizing is referred to in this study is based on Håkansson and Ford's (2002:137) definition of it: *"Identifying the scope for action, within existing and potential relationships and about operating effectively with others within the internal and external constraints that limit that scope."* Strategy in the IMP tradition is a matter of interactions in the context of interconnected network elements (Baraldi et al., 2007). An implication of the framework developed in this study in relation to IMP's view of strategy (Baraldi et al., 2007) is that taking part in developments in the supply network can be considered as strategizing, where understanding the focuses, directions, and scopes of each development determines how the firm can economically benefit from that development.

Previously in the thesis, a delineation was made between supply network developments that deal with relational issues and those that encompass multiple relationships. One of the most important managerial implications of the framework developed in this study is that opportunities for gaining economic benefits are not limited to the individual supplier relationships of a firm; the act of connecting relationships to each other is an important source of potential economic benefits for firms. When connecting relationships, various opportunities can surface that are unique to the activities, resources, and actors involved in those relationships. For example, to economize on scale and scope, a buying firm may attempt to increase the volume or variety of its purchase orders to a supplier by introducing new production operations to the relationship. However, the search for possibilities to economize on scale and scope – if conducted by stepping beyond the current relationship – can reveal new opportunities. For example, the focal supplier undertakes operations for its other customers, and those operations may also be useful for the focal buying firm. At the same time, to better utilize the resources of the supplier, the buying firm may help the supplier find other customers and also grant them access to those resources.

Economizing on integration with a relational scope would be limited to the activities two firms undertake in relation to each other, while with an inter-relational scope, a third firm may be able to assist the other two in making the coordination of activities more efficient. For example, connecting a supplier to the other suppliers (who produce components of a system) of a firm – and making the focal supplier responsible for delivering the complete system – can bring economies of integration that were not possible without connecting the suppliers to each other. Furthermore, economizing on innovation with an inter-relational scope can bring unique benefits that are directly related to connecting relationships to each other. For example, when a supplier buys production tools from a sub-supplier and the raw material from another sub-supplier, and produces a particular product, reaching beyond that supplier relationship and connecting with the supplier's sub-suppliers can provide the buying firm with valuable opportunities to seek and utilize the help of the sub-suppliers in solving technical problems related to the product.

At the outset of the thesis, the goal was described as to understand supply network developments from a firm's perspective. The findings of the study imply that short-term versus long-term and

cost versus benefits investment logics, if considered in isolation, are too limited to address how a development can make economic sense to a firm. The core idea of the framework developed in this study to analyze developments in a firm's supply network is in line with Håkansson and Snehota's (1995:5) suggestion that *"as managerial action is guided by how situations 'are framed', the relationship perspective and the network approach are unquestionably of consequence to management."* Such consequences appear as limitations for how a firm can develop its network, and also impact various opportunities for developments in the network. By interacting with their counterparts and working to change the relatedness of activities, resources, and actors with them, firms can make the most of those opportunities.

Developments in the firm's supply networks need to be dealt with strategically; according to Håkansson and Ford (2002:138), *"strategy in complex networks consists of attempting to influence others where possible and to benefit from their resources and, more importantly from their initiatives and their creativity."* To support taking strategic action with regard to supply network developments, this study offers a framework to analyze how each development makes economic sense. Understanding how each development changes the network (the focus), how it can potentially bring economic benefits in relation to the network (the direction), and whether or not it involves connecting multiple relationships (the scope), can be important grounds for the firm's strategizing on developments in its supply network.

7.4 RESEARCH IMPLICATIONS

The analysis presented in this thesis has focused on developing an economizing framework for supply network development. However, during the analysis a variety of issues emerged, most of which were placed outside the scope of the study, in order to maintain coherence in the formation and presentation of the core idea. Those issues primarily involve how the idea of economizing in the way it has been formulated and presented in this study can relate to other streams of thought and form promising directions for future research.

This section presents two major discussions. First, economizing on supply network development is discussed in relation to sense-making, referring to the introductory discussion presented in section 1.2. Then, the central notion of opportunity in this study's framework is expanded to identify directions for future research by relating to research on opportunity search and development.

7.4.1 ECONOMIZING AS A SENSE-MAKING PROCESS

Weick (1995) identifies seven aspects of the sense-making process: identity, retrospect, enactment, social, ongoing, enacted cues, and plausibility. The conceptualization of economizing as economic sense-making establishes a number of links to Weick's sense-making process, and raises a variety of interesting questions for future research.

In line with Weick's *identity* and *social* aspects of sense-making, economizing is also defined in terms of what the beholder sees, and as a social process. Sense-making is grounded in the identity construction of individuals and organizations, and so is economizing (or economic sense-making). To view a firm's developments in its supply network as the firm's economizing efforts means to investigate how each development can make economic sense to the firm. To view economizing as a social process means to evaluate how the results of each action turn out depends on the actions

of the others. Economizing can only be viewed from the viewpoint of one firm, but this does not mean that the outcomes of one firm's economizing in the supply network is a direct result of its expectations. Other firms' economizing and the plausibility of the focal firm's economic sense-making can create different outcomes than originally expected of a certain development by the focal firm.

It seems that an interesting question for future research is whether a framework can be developed to understand how a firms' economizing on developments in its network takes effect from and affects the other firms' economizing in the network, and can in turn result in different economic benefits. A starting point for such research can be the discussion presented in section 7.2, where the dynamics of economizing on supply network development were discussed and it was showed that economizing is a matter of interaction among firms. This question can also be raised with an organizational perspective; that is, how the economizing of each organizational unit or individual based on personal or group perceptions and intentions combines with that of the others, and results in a certain development.

Weick (1995) posits that sense-making has a *retrospective* and *ongoing* nature, meaning that making sense is reflecting on the process afterwards (in retrospect). Hence, in a sense-making process, the past is made clearer than the present or the actor's perception of the future. Gioia and Mehra (1996) highlighted the importance of situations that are neither novel nor surprising, but we can still make sense of such situations, regardless of the fact that they do not command our full attention. Hence, they suggested that sense-making comprises not only conscious and controlled processes, but also involves processes of "unconscious meaning-making." This is partly what is meant by economizing in this study as well, at least when it comes to the framework developed for analyzing developments in terms of economizing. In the framework, each development is reflected on after it takes place.

Because no development can be understood solely as an individual firm's economizing, and because everything in a firm's supply network is constantly being changed, it is difficult to analyze a future development in terms of how it makes economic sense. However, despite the difficulty, such analysis, if possible, can be rewarding. Gioia and Mehra (1996:1229) state that sense-making should also be considered as a prospective process: *"[prospective sense-making] can involve the projection of idealistic symbols and images to represent aspirations – fuzzy images that we cast into the future like fishing lures, so that we may ensnare ourselves and reel ourselves in"*. The fishing lures to which Gioia and Mehra refer can be interpreted as the "directions", in this study's framework, toward which the firm would need to economize. Hence, it is interesting to continue this thread of research by studying in-depth cases of different approaches that firms may utilize to economize in different directions given their situations. Since it is of an ongoing nature, the sense-making process has no start or end that can be analyzed by cutting the process into analytical pieces. Therefore, in following this thread of research, it is important to consider that the fishing lures a firm may aim for at each point in time are manifold, moving, and constantly changing, because the fishermen, the fish, and the waves never cease their motion.

According to Weick (1995), sense-making is a process of *enactment*, using *extracted cues,* and is *plausible*. Entity and environment affect each other; no entity is independent, or only a "plaything" in the environment. Action is an important part of sense-making, but one entity's action cannot

command the environment. Each action of each entity is a part of something larger. Sense-making is accomplished based on the cues each individual extracts from the environment, and which cues each party extracts and considers are unique to that party.

Cues from the environment are both focused on and focused by sense-making. In addition, sense-making processes are better characterized by plausibility than by accuracy. Each cue can be interpreted by different parties in different ways, and the answers found first have a greater chance to be selected, rather than continuing in a thorough search for further cues. Thompson (1976, p.10) describes it in this way: *"people simplify their analyses either by ignoring uncertainty to see rationality or by ignoring rational action to see spontaneous processes."*

These aspects of sense-making are highly compatible with the basic assumptions of the IMP tradition, and therefore appear throughout the analysis of this study, and to a large extent. The impacts of each firm's efforts to economize in different ways in the network have been emphasized. A firm's economizing in its supply network is understood more as taking part in a development than being responsible for the development as a whole.

The differentiation between a development and a change helps to cope with this issue and increase the analyzability of the phenomenon. However, although the conceptualization recognizes this important aspect, it does not suggest theoretical tools to analyze it. As a future research direction, action and reaction (Bankvall, 2011) need to be conceptualized in relation to the economizing framework, by analyzing how an attempt to economize in a firm's supply network in a particular way develops from an idea and expectation into an action, and how that action relates to the original expectations of the outcome.

7.4.2 ECONOMIZING AS AN OPPORTUNITY-DEVELOPMENT PROCESS

Throughout this thesis, "opportunity," "possibility," and similar words have been used repeatedly to show what firms take advantage of when making developments in their supply networks. In fact, economizing has been portrayed as the process by which such advantages are approached. The conceptualization of economizing presented earlier dealt with "opportunity" as a word rather than a concept. However, it seems to be a promising track for future research to understand and conceptualize economizing in supply networks as an opportunity-development process.

There are two major lines of thought in the literature where opportunity is concerned, which are here reflected on with regard to this study's conceptualization of economizing on supply network development: Kirznerian and Schumpeterian. On the one hand, Kirzner viewed opportunities primarily as existing around a firm, which, as a result of constant entrepreneurial alertness, the firm identifies and discovers (Kirzner, 1999). Hence, a Kirznerian take on opportunity is that firms search for and see or "realize" it (Kirzner, 1997). On the other hand, Schumpeterian entrepreneurial opportunity (Schumpeter, 1934) is created by the actors involved:

> *"Entrepreneurial projects are not waiting to be sought out so much as to be thought up. The entrepreneur's plans must be based on expectations and these must be created by him: an image of future markets is available not through sight but through insight. […] The Schumpeterian innovator may be admitted to the broader ranks of entrepreneurship without his*

being denatured when the role of imagination is recognized" (White, 1990:93-95).

Economizing in supply networks is a process that involves development of opportunities. In line with Johanson and Vahlne (2009), this study acknowledges the importance of the both stages of *recognition* and *exploitation* in the opportunity development process, and understands economizing on supply network development as the process of developing both Kirznerian and Schumpeterian opportunities. Schumpeterian development is a "spontaneous and discontinuous change" constantly displacing equilibrium (Croitoru, 2012). What Schumpeter means by the process of "development" is in fact "evolution," in the sense that it can be characterized by open-endedness, indeterminateness, and the combining of innovation, behavioral inertia, and selection. To Schumpeter, development has long-term outcomes which are not predictable; however, the mechanisms of the process of development (or evolution) are scientifically analyzable (Andersen, 2012).

In the discovery approach (Kirznerian opportunity), an opportunity can be realized by a firm, offered to the firm by another firm, or the focal firm may extend the opportunity to another firm. Hence, opportunity is very much a matter of exchange between parties with an interest in realizing the opportunity. Hadjikhani et al. (2005) call for studying the development of opportunities as processes that involve two or more parties gradually committing to realizing an opportunity and increasing their knowledge of its development. This view emphasizes the role of resources that take part in the process before an opportunity is exploited.

Hadjikhani et al. (2005:10), in line with Busenitz et al. (2003), explain opportunity as a result of *"cooperative activities of firms to generate and introduce new solutions."* In this study, economizing has been conceptualized as a way to emphasize interactive resources, activities, and actors. When a firm makes a development in its supply network, each of the network elements can have several development potentials. If, for example, a certain resource combination is being considered for development, the direction and scope of the development will define the opportunity. This is also the case when a certain activity configuration or a set of actor positions are to be developed.

A promising potential direction for future research can focus on economizing processes and aim to enrich the understanding of the economizing process as a process of opportunity development. The economizing framework can help to understand how opportunity can be developed in the network in relation to the parties with which a firm is involved in direct or indirect relationships. Hadjikhani et al. (2005:10) argue that development of relationships and connections among relationships involves finding better ways of combining resources through adapting and interacting, in order to increase the value of relationships and their connections. They present relationships and their interconnections as sources of opportunity discovery and creation for firms, based on four key reasons. First, relationships are comprised of competences that are complementary to the firms' competences, and this complementarity makes the firms involved in relationships more capable of developing new opportunities together. Second, the knowledge and experience gained by working with counterparts through relationships increases the chances of each firm to develop opportunities in relation to the other firm. This is also suggested by Agndal and Chetty (2007), in which they highlight the importance of opportunities that the knowledge

created through interaction between parties in business networks can reveal. Third, this advantageous knowledge and experience is usually accompanied by the opportunities that the focal firm has to partly control the resources of the other party in the relationship. Fourth, the knowledge that each firm has of its network context makes it easier for them to develop opportunities in relation to it.

Various studies have highlighted interesting aspects of studies of opportunity-driven processes that can serve as starting points for understanding economizing as an opportunity-development process. Arenius and De Clercq (2005) suggest that each individual is embedded in a unique network, and therefore the perceptions of opportunities of each differ from those of the others. Kontinen and Ojala (2011) demonstrated that opportunity development is not limited to close relationships, and that weak ties (Granovetter, 1983) can also be a source of development of particular opportunities. Vaghely and Julien (2010) investigate how entrepreneurs use information to identify opportunities, and find social interaction to be an important feature of such processes.

Economizing on supply network development acknowledges both the processes of Kirznerian and Schumpeterian opportunity development. Economizing is about developing opportunities; sometimes this is achieved by discovering and accessing opportunities that exist in the network surrounding the firm, and sometimes it is accomplished by creating new opportunities. The economizing framework presented in this thesis points out possibilities for future research in two directions. First, through this conceptualization of economizing, the relational and inter-relational nature of the opportunity development process can be highlighted. In other words, economizing in supply networks is understood in terms of opportunities that are developed in relation to the counterparts in the supply network; opportunity development "on a firm's own" has no meaning. Future research in this field could examine how seeking and creating opportunities can be conceptualized in terms of the economic logics that drive them.

In such conceptualization, the interplay between the firms' interpretations of developments in terms of different economies and diseconomies can play an important role. This would provide possibilities to depart from a firm-centric perspective (as employed in this study), in favor of a network-centered perspective. This can enable a more in-depth understanding of how the different firms involved in an industrial network make sense of developments *of* the industrial network, in terms of time- and perspective-dependent economies and diseconomies. Furthermore, with a network approach, the economizing framework can be used to study the mechanisms of opportunity development as a process. This process is defined by the changes in the relatedness among the three key elements of an industrial network, its actors, resources, and activities. The goal of this direction for future research can be to conceptualize developments in a firm's supply network in terms of theoretical constructs that can contribute to greater understanding of processes in which opportunities are created and sought after by the firms involved.

7.5 METHODOLOGICAL REFLECTIONS

Aside from the implications that the findings of the study have for management and future research, the process of the study and the methodological challenges faced during that process also inspired some reflections. Below, those reflections are discussed in terms of three major issues: the issue of making sense of the research process, the issue of partial matching and sense-making, and the issue of evaluating the quality of the study.

7.5.1 THE ISSUE OF MAKING SENSE OF THE RESEARCH PROCESS

The aim guiding the study was not "to develop a framework for analyzing how a firm economizes on supply network development, and to develop an understanding of supply network development from a firm's perspective." In fact, the aim has been as much a product of the process of the study as it has contributed to the progress of the study. This is no surprise, given that the study has been conducted with a systematic combining approach. Systematic combining suggests that research progresses in the interplay between theory and empirics; the redirections of the researcher in the theoretical and empirical worlds, and its matching of the case and the framework developed, actually drive the study (Dubois and Gadde, 2002). Hence, studies directed by systematic combining cannot have a linear process, such as research processes described by models inspired by the inductive/deductive divide.

However, systematic combining was not a conscious and rational choice in this study; I did not start from a point knowing that I would eventually change it. At each point in time during the process of the study, I was convinced that the directions I had chosen for data collection, the case I had designed, the extant theories I had selected to design and analyze the case, and the framework I had developed were "on the right track" towards reaching my aim, and that the aim I had formulated was relevant, reachable, and important. This is because at each point in time I have tried to make my theoretical and empirical choices and designs aligned with each other. This is a logical process, but at the same time difficult to make sense of because it is not straightforward. The problem is that if at each point in time the study has a structure that makes sense (in terms of the four cornerstones of the systematic combining approach (see Figure 3-1 on page 32)), what is the need for changing it and entering a new state? This is the first methodological issue raised in this study, the issue of making sense of the research process.

The key to confronting this issue lies in the importance of the processual aspects of the research. Based on the cornerstones of the systematic combining process, four aspects are identified to describe the process and to approach this methodological issue: *the phenomenon under study*, *the theoretical concepts used*, *the focus of empirical data collection*, and *the theory developed* (see Figure 7-3). Based on this model, the process of the study is summarized in Table 7-1 in a structured way.

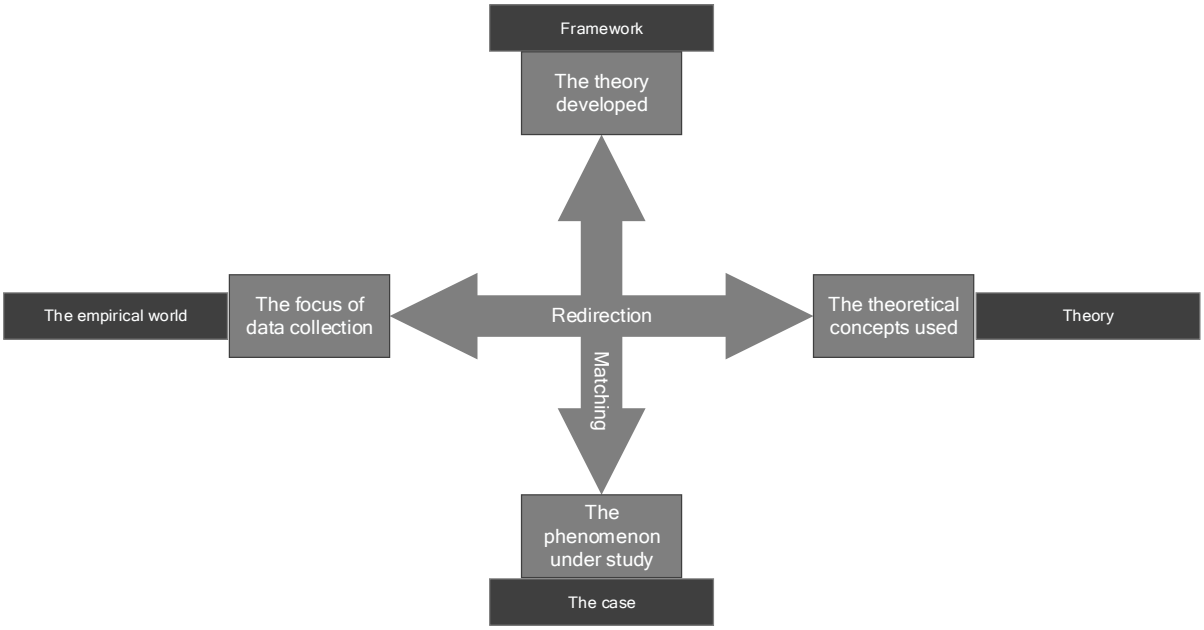


Figure 7-3: Building on the cornerstones of the systematic combining approach to explicitly present the research process

In this model, the process of the study is divided into states (the first column) that can be characterized by the aspects described within the other four columns. The study in each of its states deals with an empirical phenomenon (the second column). The phenomenon is what the study is a case of; it is an empirical setting framed and designed with the help of concepts borrowed from extant theories, and defines what the study intends to describe or explain. In the empirical world, the investigation is guided by the phenomenon. In each state of the study, while the focus of the empirical data collection (the fourth column) shows what in the empirical world is relevant to the study, the phenomenon determines how it should be framed into a case. The theoretical concepts used (the third column) are the concepts that the researcher chooses from the vast extant theories to use in relation to its investigation in the empirical world.

The goal of any study conducted using the systematic combining approach is theory building. Theories are built to present an understanding of the empirical world, and they serve as lenses that can help to see things that are important and interesting. The theory developed by the researcher (the fifth column) is a result of – and at the same time contributes to – the process of systematically combining the theoretical choices and empirical findings, and to expanding the researcher's understanding of the "meaning" of both. The directions of the researcher's search in the empirical and theoretical worlds are determined in relation to one another, and vary during the process of the study through redirections. A result of the empirical and theoretical investigations is the formation of the case and the framework. The case is the study's framing of the findings of the empirical investigation, and the framework is the study's framing of the findings of the theoretical investigation.

The case and the framework are developed in relation to each other, but not at the same time. The matching process develops the case and the framework, but takes place at different points in time. The same applies to the redirections in the empirical and theoretical investigations, which also do not take place at the same time. Particular empirical findings may point at the applicability of particular theoretical concepts. Inspired by those concepts, the researcher may frame a case and,

using that case, aim to (or manage to) develop a framework that helps in analyzing a phenomenon or explaining a particular observation. All of these tasks take time, and during each of the four processes[21], new findings may lead to new directions for the investigations or new ways of framing the case or the theory. In the midst of the process, it may seem impossible to make sense of what the researcher is concurrently doing; this is because while research advances in one of the blocks of Figure 7-3, new requirements and directions emerge for the advancement of the research in the other blocks.

Therefore, making sense of a systematic combining process seems to be only possible in retrospect. At each point in time, the researcher may be able to look back and make sense of the path of his/her research, but during the time the study is creating and traveling down that path such sense-making may not be possible. Retrospective sense-making of the process becomes possible only when the advancement of the study in the building blocks of the systematic combining approach is settled; that is, when the investigations for new empirical data or theoretical concepts are paused, and a framework is developed as a result of a careful analysis of a case that is deliberately framed in relation to the development of the framework. In this study, such situations have occurred three times: at the end of my master's thesis work (represented by the end of state 1 in the table below), the end of my licentiate thesis work (the end of state 3), and the end of my Ph.D. thesis work (the end of state 6).

[21] Empirical investigation, the search for relevant theoretical concepts, the framing of the case, and the development of the framework.

Table 7-1: The research process summarized in line with the systematic combining approach

Arbitrary state of the research process	The phenomenon under study	The theoretical concepts used	The focus of empirical data collection	The theory developed
1	Investments in international supplier relationships	Considerations and cost-benefit analysis tools for low-cost country sourcing	How investments in international supplier relationships are considered and approached by firms	Three approaches to low-cost country sourcing and a list of considerations for investments in international supplier relationships
2	Moving activities to low-cost countries	Activity interdependencies and the multiple boundaries of the firm	How the move of an activity to a low-cost country affects other activities	A framework identifying different impacts on an activity pattern, depending on the way different boundaries are crossed, and the interdependencies between the moved activity and other activities (not fully developed)
3	Initiating and developing a supplier base in a new context	Economies, collaboration types, activity interdependencies, and dimensions of involvement in buyer-supplier relationships	The start of a firm in a new context with a holistic and long-term approach; trying to see what firms achieved and how	A framework for analyzing what can be achieved from particular features of relationships in a supplier base
4	Developments in the structure of a	Economizing, activity interdependencies, resource	Network pictures at different time periods, and	A framework for analyzing the economic consequences and antecedents of

	firm's supply network	interfaces, dimensions of involvement	stories of developments in the network	developments in a firm's supply network between different points in time (not fully developed)
5	A firm's developments in its relationships and connected relationships in different time periods	Economizing, activity similarity and sequentiality, resource versatility and indivisibility, actor jointness and co-evolution (to analyze developments)	Changes in the content of a firm's relationships and connections among relationships in terms of activities, resources, and actors	A framework for analyzing a firm's developments in its supplier relationships, across its supplier relationships, and of its supply network, in terms of how they make economic sense (not fully developed)
6	A firm's participation in developments in its supply network	Economizing, activity adjusting, resource adapting, and actor relating (to analyze how a development is made), activity similarity and sequentiality, resource versatility and capacity utilization, actor jointness and co-evolution (to analyze what can be achieved)	The stories and details about how the different firms' attempts to make changes and gain economic benefits impact the developments in the focal firm's supply network	A framework for analyzing how developments in a firm's supply network make economic sense in terms of the *focus*, *direction*, and *scope* of the "changes" that constitute each development.

7.5.2 THE ISSUE OF PARTIAL MATCHING AND SENSE-MAKING

As described in the sub-sections under section 3.1, this study took off with an idea that is far from its final form, but still has impact on the ultimate state of the study. Presenting and evaluating the complicated process the study has taken along these five to six years was a complicated task, because in fact it has changed frequently and significantly. One important element that has changed along the process of the study is the framework. The development of the framework, as stated before, is the goal of studies conducted with a systematic combining approach, the framework being the researcher's developed theory. The researcher develops the framework by matching it iteratively with the framing of the case. The second major issue I faced during this study concerns the matching process.

Each iteration of making a framework or a case needs to be based on iterations of empirical or theoretical investigations, because new empirical data or theoretical concepts are needed to drive the new case or framework developments. New data or concepts at each point in time during the study are data or concepts that the researcher does not utilize in the development of the case or the framework at that point in time. This means that at each point in time, there are other theoretical concepts that the researcher is aware of or other empirical data that the researcher has collected but does not involve in the development of the case or the framework. Alternatively, new data or concepts can refer to data or concepts that are used in the previous states of the study, which the researcher finds new ways of using in the focal point in time – or the researcher develops and learns about other meanings of them. Here, it is important to note that each iteration deals with one of the building blocks of the systematic combining approach (see Figure 7-3), although advancement in each block relates to the previous or future advancements in the other blocks.

In several iterations during the process of a study, different frameworks may be developed by the researcher, which may match the case in some aspects but not in others. This creates "partial matchings" of the case and the framework developed by the researcher at each point in time. In fact, finding a perfect match between a framework and a case is neither possible nor desirable. To have a perfect match between the case and the framework means to frame the empirical observations in a way that they perfectly suit the theoretical concepts chosen for explaining them, and to develop theories that can perfectly describe or explain them. Every theoretical conceptualization of an empirical phenomenon entails simplifications of the empirical observations. Without such simplifications, theory is merely a simple description of the empirical observations. Hence, partial matching of the framework and the case is required for the study to develop theories.

More importantly, those imperfections are important opportunities for the progress of the study with a systematic combining approach. To find better matches, the researcher may expand its empirical or theoretical investigation, and/or reframe the case or the framework, and in this way fuel the processes of matching and redirection. While analyzing a set of collected data framed as a case using the chosen theoretical concepts to develop a framework, the researcher may come across new findings that illuminate new directions for the investigations. Hence, the researcher may leave its framework development task unfinished and attend to new empirical or theoretical investigations.

By the time the researcher returns to the task of developing the framework, he/she may have so much new empirical data or theoretical concepts prepared to be used for developing the framework that the unfinished framework may seem completely irrelevant. This creates various "partial frameworks," which, rather than being a framed set of theoretical tools prepared to tackle an empirical problem, are useful merely for making sense of the research process when recognizing the problems each of those partial frameworks was designed to tackle and the ways each would be used to do so. Thus, a research process designed using a systematic combining approach can be replete with partial matching, which should be considered a major advantage for this type of approach.

7.5.3 THE ISSUE OF EVALUATING THE QUALITY OF THE STUDY

Approaches to evaluate and elevate the quality of the study have been addressed previously (in section 3.4) as a major challenge for case research. While quality criteria derived or inspired by quantitative research methods, such as validity and reliability (Yin, 2003) or trustworthiness (Lincoln and Guba, 1985), dominate the quality evaluation discussions in case studies, Dubois and Gibbert (2010) suggest that the complicated and non-linear process of case research can best be evaluated by transparency in the presentation of the research process and the motivation of the theoretical, empirical and methodological choices made along the process.

In section 3.4, referring to Dubois and Gibbert (2010) and other references, I argued that such transparency can best evaluate the quality of the study, and highlighted a few challenges I had faced while conducting the analysis during the study. Transparency in this study was in the presentation and motivation of the theoretical and empirical choices during the study process presented in the sub-sections 3.1.1 to 3.1.4. This was accomplished by retrospectively making sense of those choices and how the partial matching of the case and the framework during the study process has resulted in the emergence of new opportunities for matching and redirecting, eventually resulting in the current state of the study. The third methodological issue concerns my reflections on my attempts to evaluate the quality of this study. This issue is presented in terms of discussions highlighting three aspects of research quality; the *appropriateness* of the research process, the *relevance* of the aim of the research, and the *usefulness* of the findings of the research.

The first discussion deals with the appropriateness of the research process. It is no surprise that during the process of the study much is unknown. The domain of the unknowns covers not only the objects of the study, but also the extant theories that can possibly be used to understand those objects, as well as the way the theoretical concepts and empirical data can be framed and used in relation to each other in order to address the aim of the study. During the process of the study, theoretical concepts are chosen and used to frame the case and analyze the framed empirical data. The choice of theoretical concepts may not match the case, but this may not be evident when the choices are made.

The analysis of the case highlights the partial matches between the case and the framework. However, it does not necessarily take a complete analysis of the case for a researcher to find out that the case and the framework do not match. This results in a number of incomplete analyses along the process. When transparently describing the process, those incomplete analyses can be rightfully used as motivations for the twists and turns in the process of the study. The reasons behind leaving each analysis incomplete can reveal why certain new redirections in the theoretical

or empirical investigations have taken place. The shortcomings of each incomplete analysis can show how the researcher has tried to overcome the problems by matching the case and the framework.

The appropriateness of the research process tries to evaluate if the study has been conducted properly. This raises two concerns: What is appropriate, and how can that be evaluated? The answers lie most likely in the interpretivist epistemological assumptions underlying systematic combining. A process guided by the systematic combining approach relies heavily on the researcher's personal choices and interpretations that change along the process of the study; the researcher chooses domains for theoretical and empirical investigations, interprets his/her observations and readings, expands understanding of the collected data and the studied theoretical concepts, and develops theoretical concepts to understand the empirical phenomena he/she studies.

Therefore, the appropriateness of the way a study has been conducted cannot be measured by a standard. Instead of trying to verify the findings of the study, each study has to be evaluated based on the various partial matchings of the framework and the case that have emerged along the way, and the motivations of the researcher for dealing with them. In essence, this aspect of research quality can be evaluated by transparently presenting the research process, emphasizing the case-framework mismatches and the incomplete analyses, as well as presenting a convincing argument to the reader that the choices that the researcher has made to deal with each of the imperfections has been relevant and useful. The process of case research utilizing a systematic combining approach is a complicated path for the researcher to take. Transparency in the presentation of and motivation behind the study process helps establish the quality of the study by convincing the reader that the path that the researcher has taken makes sense.

The second discussion about the evaluation of the quality of the study deals with the relevance of the aim. Just like the other elements of the research, the aim also changes in iterations during the process of the study, and the relevance of the aim is also unknown. With each iteration, one of the building blocks of the systematic combining approach is altered. Such alterations can have implications for the aim, which the study is able to fulfill given its new set of empirical and theoretical investigation domains and case and framework developments. At each point in time, achievement of the aim is enabled by the choices made for the building blocks of the systematic combining approach. Whether or not the aim is reformulated after each iteration, each iteration in fact changes the aim that the study can fulfill. This discussion highlights the question of whether the aim that is formed at each iteration is relevant.

The relevance of the aim should be motivated theoretically and practically. A practically relevant aim can be formulated by seeking potentials in the empirical world for the study to make a contribution. Theoretical relevance of the aim can be assessed by relating the aim to existing theories and problematizing the phenomenon under study. Nevertheless, it is not possible to seek and formulate a practically and theoretically relevant aim after each iteration in the process of the study. The most important consideration is that the aim is the "red thread" holding the different research elements together. New formulations of the aim should be drawn and used when the empirical and theoretical investigations, and the development of the case and the framework, settle down, and presentable forms of the study take shape. As the study reaches such states, asking this

question becomes more and more important: What can this developed framework do, and why is this practically or theoretically relevant?

The third discussion deals with the usefulness of the findings of the study. The final result of a study conducted with a systematic combining approach is the building of new theories. External validity (Yin, 2003) and transferability (Lincoln and Guba, 1985) are the two dominant approaches for ensuring that the findings of a study can be used in situations other than those in which the study has been conducted. In essence, those methods look for possibilities for disconnecting the findings of the study from their context and applying them in other contexts. Therefore, those methods are suitable for studies that intend to make generalizations beyond their contexts.

The systematic combining approach, however, does not aim for generalizations. Theories that a researcher develops during the systematic combining process are not meant to generalize, at least statistically, to other contexts; rather they present illustrations of situations and processes that are useful because, according to Weick (2007:14), *"if an event can happen in one place, then it likely can happen again."* Whether those theories are useful or not is a matter of the study's success in convincing research communities to use its results in their future studies. Hence, for a case study conducted in accordance with the systematic combining approach, it is perhaps neither possible nor relevant to transfer its generalization to other contexts. Instead, transparency in the process of the evolution of the framework in relation to the other building blocks of the systematic combining approach can be a promising starting point to evaluate why the results of the study can be useful for future research.

Coherence in the presentation of the study also plays a vital role in making the study more useful; explicitly highlighting elements that emphasize coherence in the presentation of the study can significantly improve the usefulness of the theories developed by the study. With a systematic combining approach, theory is grounded in empirical findings, and vice versa, and this forms the basis for the study's contributions to theory and practice. To show the usefulness of the findings of the study, it is important to convince the reader transparently that the processes of grounding theory in empirical data – and grounding empirical data collection in theory – have been undertaken properly. By showing that the path taken by the researcher between the theoretical and empirical investigations makes sense in retrospect, the researcher can improve the coherence of the presentation of the study, and extend the usefulness of the findings. Frequent references to the phenomenon under study, the empirical evidence, the theoretical concepts, and the logical arguments across different sections of the presentation can help convince the reader regarding the usefulness of the study. The essence of this reflection is that instead of trying to show why the study can be useful, the efforts of the researcher should focus on making the theories developed by the study more easily understandable and more useful.

References

2013. The Merriam-Webster Online Dictionary.

ABBOTT, A. 1992. What do cases do? Some notes on activity in sociological analysis. *In:* RAGIN, C. C. & BECKER, H., S. (eds.) *What is a case? Exploring the foundations of social inquiry.* Cambridge: Cambridge University Press.

AGNDAL, H. & CHETTY, S. 2007. The impact of relationships on changes in internationalisation strategies of SMEs. *European Journal of Marketing,* 41**,** 1449–74.

AHUJA, G. 2000. Collaboration networks, structural holes, and innovation: A longitudinal study. *Administrative science quarterly,* 45**,** 425–55.

ALBANI, A., BAZIJANEC, B., TUROWSKI, K. & WINNEWISSER, C. Component framework for strategic supply network development. *In:* BENCZÚR, A., DEMETROVICS, J. & GOTTLOB, G., eds. East-European Conference on Advances in Databases an dInformation Systems, 2004 Budapest, Hungary. Springer Verlag, 67–82.

ALCHIAN, A. A. & DEMSETZ, H. 1972. Production, information costs, and economic organization. *The American economic review,* 62**,** 777–95.

ALDERSON, W. 1954. Factors governing the development of marketing channels. *In:* CLEWETT, R. (ed.) *Marketing channels for manufactured products.* Homewood, IL: Richard D. Irwin.

ALDERSON, W. 1957. *Marketing behavior and executive action,* Homewood, IL, Richard D. Irwin.

ALDERSON, W. The analytical framework for marketing. *In:* DELBERT, D., ed. Conference of Marketing Teachers from Far Western States, 1958 University of California, Berkeley, U.S., 15–28.

ALDERSON, W. 1965. *Dynamic marketing behavior: A functionalist theory of marketing*, Homewood, IL.

ALDERSON, W. 2006. The heterogeneous market and the organized behavior system. *In:* WOOLISCROFT, B., TAMILIA, R. D. & SHAPIRO, S. J. (eds.) *A Twenty-First Century Guide to Aldersonian Marketing Thought.* Boston: Kluwer Academic Publishers.

ANDERSEN, E. S. 2012. Schumpeter's core works revisited: Resolved problems and remaining challenges. *Journal of Evolutionary Economics,* 22**,** 627–48.

ARAUJO, L., DUBOIS, A. & GADDE, L.-E. 1999. Managing interfaces with suppliers. *Industrial Marketing Management,* 28**,** 497–506.

ARAUJO, L., DUBOIS, A. & GADDE, L.-E. 2003. The multiple boundaries of the firm. *Journal of Management Studies,* 40**,** 1255–77.

ARENIUS, P. & DE CLERCQ, D. 2005. A network-based approach on opportunity recognition. *Small Business Economics,* 24**,** 249–265.

BANKVALL, L. 2011. *Activity Linking in Industrial Networks,* Gothenburg, Chalmers University of Technology.

BARALDI, E., BRENNAN, R., HARRISON, D., TUNISINI, A. & ZOLKIEWSKI, J. 2007. Strategic thinking and the IMP approach: A comparative analysis. *Industrial Marketing Management,* 36**,** 879–894.

BARALDI, E., GRESSETVOLD, E. & HARRISON, D. 2012. Resource interaction in inter-organizational networks: Foundations, Comparison, and a research agenda. *Journal of Business Research,* 65**,** 266–76.

BARALDI, E. & STRÖMSTEN, T. 2009. Controlling and combining resources in networks - from Uppsala to Stanford, and back again: the case of a biotech innovation. *Industrial Marketing Management,* 38**,** 541–52.

BARTUNEK, J. M. 2012. How qualitative research on change can contribute to changing practice. *The Journal of Applied Behavioral Science,* 48**,** 272–77.

BIZZI, L. & LANGLEY, A. 2012. Studying processes in and around networks. *Industrial Marketing Management,* 41**,** 224–234.

BLAU, P. M. 1964. *Exchange and Power in Social Life,* New York, Wiley.
BLOIS, K. J. 1971. Vertical Quasi-Integration. *Journal of Industrial Economics,* 20**,** 253–72.
BLOIS, K. J. 1990. Transaction costs and networks. *Strategic Management Journal,* 11**,** 493-6.
BOZARTH, C., HANDFIELD, R. & DAS, A. 1998. Stages of glopbal sourcing strategy evolution: an exploratory study. *Journal of Operations Management,* 16**,** 241–55.
BRYMAN, A. & BELL, E. 2007. *Business research methods,* New York, Oxford University Press.
BUSENITZ, L. W., WEST, G. P., SHEPHERD, D., NELSON, T., CHANDLER, G. N. & ZACHARAKIS, A. 2003. Entrepreneurship research in emergence: Past trends and future directions. *Journal of management,* 29**,** 285–308.
CANTÙ, C., CORSARO, D. & SNEHOTA, I. 2012. Roles of actors in combining resources into complex solutions. *Journal of Business Research,* 65**,** 139–50.
CARTER, J. R. & FERRIN, B. G. 1995. The impact of transportation costs on supply chain management. *Journal of Business Logistics,* 16**,** 189–212.
CHANDLER, A. D. 1990. *Scale and scope: The dynamics of industrial capitalism,* Cambrige, Mass, Harvard University Press.
COASE, R. H. 1937. The Nature of the Firm. *Economica,* 4**,** 386–405.
COLVILLE, I. & PYE, A. 2010. A sensemaking perspective on network pictures. *Industrial Marketing Management,* 39**,** 372–380.
COOK, K. & EMERSON, R. 1978. Power equity and commitment in exchange networks. *American Sociological Review,* 43**,** 721–39.
CROITORU, A. 2012. Schumpeter, JA, 1934 (2008), The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle. *Journal of Comparative Research in Anthropology and Sociology,* 3**,** 137–148.
CUNNINGHAM, M. T. 1980. International marketing and purchasing of industrial goods features of a european research project. *European Journal of Marketing,* 14**,** 322–38.
CYERT, R. M. & MARCH, J. G. 1963. *A behavioral theory of the firm,* NJ, Englewood Cliffs
DAS, A., NARASIMHAN, R. & TALLURI, S. 2006. Supplier integration—Finding an optimal configuration. *Journal of Operations Management,* 24**,** 563–82.
DUBOIS, A. 1998. *Organizing Industrial Activities Across Firm Boundaries,* New York, Routledge.
DUBOIS, A. 2003. Strategic cost management across boundaries of firms. *Industrial Marketing Management,* 32**,** 365–74.
DUBOIS, A. & ARAUJO, L. 2004. Research methods in industrial marketing studies. *In:* HÅKANSSON, H., HARRISON, D. & WALUSZEWSKI, A. (eds.) *Rethinking Marketing.* Chichester: John Wiley & Sons Ltd.
DUBOIS, A. & ARAUJO, L. 2007. Case research in purchasing and supply management: opportunities and challenges. *Journal of Purchasing and Supply-Chain Management,* 13**,** 170–81.
DUBOIS, A. & GADDE, L.-E. 2002. Systematic combining: An abductive approach to case research. *Journal of Business Research,* 5**,** 553-60.
DUBOIS, A. & GADDE, L.-E. 2014. "Systematic combining"—A decade later. *Journal of Business Research,* 67**,** 1277–84.
DUBOIS, A., GADDE, L.-E. & MATTSSON, L.-G. 2003. Change and continuity in the supplier base: a case study of a manufacturing firm 1964-2002. *Journal of Customer Behaviour,* 2**,** 409–32.
DUBOIS, A. & GIBBERT, M. 2010. From complexity to transparency: managing the interplay between theory, method and empirical phenomena in IMM case studies. *Industrial Marketing Management,* 39**,** 129–36.
DUBOIS, A., HULTHÉN, K. & PEDERSEN, A.-C. 2004. Supply chains and interdependence: A theoretical analysis. *Journal of Purchasing & Supply Management,* 10**,** 3–9.

DUBOIS, A. & PEDERSEN, A.-C. 2002. Why relationships do not fit into purchasing portfolio models – a comparison between the portfolio and industrial network approaches. *European Journal of Purchasing & Supply Management,* 8**,** 35–42.
EASTON, G. 1995. Methodology and industrial networks. *In:* MÖLLER, K. K. & WILSON, D. T. (eds.) *Business Marketing: An interaction and network perspective.* Norwell (MA): Kluwer Academic Publishing.
EASTON, G. 2010. Critical realism in case study research. *Industrial Marketing Management,* 39**,** 118–28.
EBERS, M. & GRANDORI, A. 1997. The forms, costs, and development dynamics of inter-organisational networking. *In:* EBERS, M. (ed.) *The formation of inter-organisational networks.* Oxford: Oxford University Press.
EDMONDSON, A. C. & MCMANUS, S. E. 2007. Methodological fit in management field research. *Academy of Management Review,* 32**,** 1155–79.
EVAN, W. M. 1966. The organization-set: toward a theory of interorganizational relation. *In:* THOMPSON, J. (ed.) *Approaches to organizational design.* Pittsburgh: University of Pittsburgh Press.
FLICK, U. 2006. *An introduction to qualitative research,* London, SAGE Publications Ltd.
FLYVBJERG, B. 2006. Five misunderstandings about case-study research. *Qualitative inquiry,* 12**,** 219–45.
FORD, D. 1980. The Development of Buyer-Seller Relationships in Industrial Markets. *European Journal of Marketing,* 14**,** 339–53.
FORD, D. & HÅKANSSON, H. 2006. Th Idea Of Business Interaction. *The IMP Journal,* 1**,** 4–20.
FORD, D., HÅKANSSON, H. & JOHANSON, J. 1986. How do companies interact? *Industrial Marketing and Purchasing,* 1**,** 26–41.
FORD, D. & SAREN, M. 1996. *Technology strategy for business,* London, Thomson.
FORD, D. & SAREN, M. 2001. *Managing and marketing technology,* London, International Thomson.
FREDRIKSSON, P. & GADDE, L.-E. 2005. Flexibility and rigidity in customization and build-to-order production. *Industrial Marketing Management,* 34**,** 695–705.
FREYTAG, P. V. & RITTER, T. 2005. Dynamics of relationships and networks—creation, maintenance and destruction as managerial challenges. *Industrial Marketing Management,* 34**,** 644–47.
GADDE, L.-E., HJELMGREN, D. & SKARP, F. 2012. Interactive resource development in new business relationships. *Journal of Business Research,* 65**,** 210–7.
GADDE, L.-E., HUEMER, L. & HÅKANSSON, H. 2003. Strategizing in industrial networks. *Industrial Marketing Management,* 32**,** 357–64.
GADDE, L.-E. & HÅKANSSON, H. 1993. *Professional Purchasing,* London, Routledge.
GADDE, L.-E. & HÅKANSSON, H. 1994. The changing role of purchasing: reconsidering three strategic issues. *European Journal of Purchasing and Supply Management,* 1**,** 27–35.
GADDE, L.-E. & HÅKANSSON, H. 2001. *Supply Network Strategies,* Chichester, UK, John Wiley & Sons LTD.
GADDE, L.-E., HÅKANSSON, H. & PERSSON, G. 2010. *Supply Network Strategies,* Chichester, John Wiley & Sons Ltd.
GADDE, L.-E. & MATTSSON, L.-G. 1987. Stability and change in network relationships. *International Journal of Research in Marketing,* 4**,** 29–41.
GADDE, L.-E. & PERSSON, G. 2004. Developments on the Supply side of Companies. *In:* HÅKANSSON, H., HARRISON, D. & WALUSZEWSKI, A. (eds.) *Rethinking Marketing: Developing a New Understanding of Markets.* Chichester: Wiley & Sons.
GADDE, L.-E. & SNEHOTA, I. 2000. Making the most of supplier relationships. *Industrial Marketing Management,* 29**,** 305–16.

GADDE, L. E., HÅKANSSON, H., JAHRE, M. & PERSSON, G. 2002. " More instead of less"-Strategies for the use of logistics resources. *Journal on Chain and Network Science,* 2**,** 81–91.

GELDERMAN, C. J. & VAN WEELE, A. J. 2005. Purchasing portfolio models: a critique and update. *Journal of Supply Chain Management,* 41**,** 19–28.

GIOIA, D. A. & MEHRA, A. 1996. Sensemaking in Organizations by Karl E. Weick, Review by: Dennis A. Gioia and Ajay Mehra. *The Academy of Management Review,* 21**,** 1226–30.

GRANOVETTER, M. 1983. The strength of weak ties: A network theory revisited. *Sociological theory,* 1**,** 201–33.

HADJIKHANI, A., GHAURI, P. & JOHANSON, J. 2005. Introduction: Opportunity Development in business Networks. *In:* GHAURI, P., HADJIKHANI, A. & JOHANSON, J. (eds.) *Managing opportunity development in business networks.* New York: Palgrave McMillan.

HALINEN, A. & TÖRNROOS, J.-Å. 2005. Using case methods in the study of contemporary business networks. *Journal of Business Research,* 58**,** 1285–97.

HARLAND, C. M., LAMMING, R. C., ZHENG, J. & JOHNSEN, T. E. 2001. A Taxonomy of Supply Networks. *Journal of Supply Chain Management,* 37**,** 21–7.

HARLAND, C. M., ZHENG, J. & LAMMING, R. C. 2004. A conceptual model for researching the creation and operation of supply networks. *British Journal of Management,* 15**,** 1–21.

HEDAA, L. & RITTER, T. 2005. Business relationships on different waves: Paradigm shift and marketing orientation revisited. *Industrial Marketing Management,* 34**,** 714–21.

HEIDE, J. B. & MINER, A. S. 1992. The shadow of the future: Effects of anticipated interaction and frequency of contact on buyer-seller cooperation. *Academy of management journal,* 35**,** 265–91.

HESSEL, I. & NAJAFI, N. Interfacing in supplier relationships: A theoretical analysis of the multiple roles of purchasing. IPSERA Conference, 2014 Johannesburg, South Africa.

HICKS, J. R. 1976. 'Revolution' in economics. *In:* LATSIS, S. J. (ed.) *Method and Appraisal in Economics.* Cambridge: Cambridge University Press.

HOLMEN, E. 2001. *Notes on a conceptualisation of resource-related embeddedness of interorganisational product development,* Sønderborg, University of Southern Denmark.

HOLMEN, E., AUNE, T. B. & PEDERSEN, A.-C. 2013. Network pictures for managing key supplier relationships. *Industrial Marketing Management,* 42**,** 139–51.

HOLMEN, E., HÅKANSSON, H. & PEDERSEN, A.-C. 2003. Framing as a means to manage a supply network. *Journal of Customer Behaviour,* 2**,** 385–407.

HOLMEN, E. & PEDERSEN, A.-C. 2003. Strategizing through analyzing and influencing the network horizon. *Industrial Marketing Management,* 32**,** 409–18.

HOLMEN, E., PEDERSEN, A.-C. & JANSEN, N. 2007. Supply network initiatives – a means to recognize the supply base? *Journal of Business & Industrial Marketing,* 22**,** 178–86.

HOLMEN, E., PEDERSEN, A.-C. & TORVATN, T. 2005. Building relationships for technological innovation. *Journal of Business Research,* 58**,** 1240–50.

HOMANS, C. G. 1961. *Social Interaction,* New York, Harcourt, Brace and World.

HÅKANSSON, H. 1982. *International marketing and purchasing of industrial goods: An interaction approach,* Chichester, John Wiley.

HÅKANSSON, H. 1987. *Industrial Technological Development: A Network Approach,* London, Croom Helm.

HÅKANSSON, H. & FORD, D. 2002. How should companies interact in business networks. *Journal of Business Research,* 55**,** 133–9.

HÅKANSSON, H., FORD, D., GADDE, L. E., SNEHOTA, I. & WALUSZEWSKI, A. 2009. *Business in Networks,* Chichester, John Wiley and Sons, Ltd.

HÅKANSSON, H. & HARRISON, D. 2006. Activation in resource networks: a comparative study of ports. *Journal of Business and Industrial Marketing,* 21**,** 231–8.

HÅKANSSON, H. & LAAGE-HELLMAN, J. 1984. Developing a network R&D strategy. *Journal of product innovation management,* 1**,** 224–37.
HÅKANSSON, H., OLSEN, P. I. & BAKKEN, T. 2013. Agency and Economizing in Interacted Economies. *The IMP Journal,* 7**,** 106–11.
HÅKANSSON, H. & PERSSON, G. 2004. Supply chain management: the logic of supply chains and networks. *The International Journal of Logistics Management,* 15**,** 11–26.
HÅKANSSON, H. & SNEHOTA, I. 1989. No business is an island: the network concept of business strategy. *Scandinavian journal of management,* 5**,** 187–200.
HÅKANSSON, H. & SNEHOTA, I. 1995. *Developing relationships in business networks,* London, Routledge.
HÅKANSSON, H. & SNEHOTA, I. 2000. The IMP Perspective, Assets and Liabilities of Relationships. *In:* SHETH, J. N. (ed.) *Handbook of Relationship Marketing.* Thousand Oaks: Sage Publications.
HÅKANSSON, H. & WALUSZEWSKI, A. 2002. *Managing technological development-IKEA, the environment and technology,* London, Routledge.
JACOBIDES, M. G. & CROSON, D. C. 2001. Information policy: Shaping the value of agency relationships. *Academy of Management Review,* 26**,** 202–23.
JARILLO, J. C. 1988. On strategic networks. *Strategic Management Journal,* 9**,** 31-41.
JOHANSON, J. 1966. *Svensk kvalitetsstål på utländska marknader (Swedish Special Steel in Foreign Markets)*. Licentiate Licentiate thesis, monograph, Uppsala University: Department of Business Administration.
JOHANSON, J. & MATTSSON, L.-G. 1992. Network positions and strategic actions - an analytical framework. *In:* AXELSSON, B. & EASTON, G. (eds.) *Industrial networks: a new view of reality.* London: Routledge.
JOHANSON, J. & VAHLNE, J.-E. 2009. The Uppsala internationalization process model revisited: From liability of foreignness to liability of outsidership. *Journal of International Business Studies,* 40**,** 1411–31.
JOHNSEN, T. E., WYNSTRA, F., ZHENG, J., HARLAND, C. M. & LAMMING, R. C. 2000. Networking activities in supply networks. *Journal of Strategic Marketing,* 8**,** 191–81.
KARLSSON, C. 2009. *Researching Operations Management,* New York, Routledge.
KIRZNER, I. M. 1973. Competition and entrepreneurship. University of Chicago Press.
KIRZNER, I. M. 1997. Entrepreneurial discovery and the competitive market process: An Austrian approach. *Journal of economic Literature***,** 60–85.
KIRZNER, I. M. 1999. Creativity and/or alertness: A reconsideration of the Schumpeterian entrepreneur. *The Review of Austrian Economics,* 11**,** 5–17.
KONTINEN, T. & OJALA, A. 2011. Network ties in the international opportunity recognition of family SMEs. *International Business Review,* 20**,** 440–53.
KRALJIC, P. 1983. Purchasing must become supply management. *Harvard Business Review,* September-October**,** 109–17.
KUSUNOKI, K. & NUMAGAMI, T. 1998. Interfunctional transfers of engineers in Japan: Empirical findings and implications for cross-functional integration. *IEEE Transaction on Engineering Management,* 45**,** 250–62.
LAVIE, D. 2006. The competitive advantage of interconnected firms: an extension of the resource-based view. *Academy of Management Review,* 31**,** 638–58.
LEVINE, S. & WHITE, P. E. 1961. Exchange as a conceptual framework for the study of interorganizational relationships. *Administrative science quarterly***,** 583–601.
LINCOLN, Y. S. & GUBA, E. G. 1985. *Naturalistic Inquiry,* Thousand Oaks, Sage Publications.
LITWAK, E. & HYLTON, L. F. 1962. Interorganizational analysis: A hypothesis on co-ordinating agencies. *Administrative Science Quarterly***,** 395–420.
MARCH, J. G. & SIMON, H. A. 1958. *Organizations,* New York, Wiley.

MASSON, R. J. 1986. User-vendor relationships in the Scottish electronics industry. *International Journal of Quality and Reliability,* 3**,** 31–7.
MATTSSON, L.-G. 1969. *Integration and efficiency in marketing systems,* Stockholm, Economic Research Institute, Stockholm School of Economics.
MAXWELL, J. A. 2012. *Qualitative Research Design: An Interactive Approach: An Interactive Approach,* Thousand Oaks, CA, Sage.
MILES, M. B. & HUBERMAN, A. M. 1994. *Qualitative data analysis: An expanded sourcebook*, Sage.
MUESSIGMANN, N. & ALBANI, A. Supplier Network Management: Evaluating and Rating of Strategic Supply Networks. 21th ACM Symposium on applied computing, 2006. 1511–5.
NAJAFI, N. 2013a. *Initiating and developing a supplier base in a new context,* Gothenburg, Chalmers University of Technology.
NAJAFI, N. 2013b. Supply network development: A case of developing a supply base in China. *The IMP Journal,* 7**,** 59–90.
NELLORE, R. & SÖDERQUIST, K. 2000. Portfolio approaches to procurement: Analysing the missing link to specifications. *Long Range Planning,* 33**,** 245–67.
OLSEN, R. F. & ELLRAM, L. M. 1997. A portfolio approach to supplier relationships. *Industrial marketing management,* 26**,** 101–13.
PENROSE, E. T. 1959. *The Theory of the Growth of the Firm,* New York, John Wiley.
PENTLAND, B. T. 1999. Building process theory with narrative: From description to explanation. *Academy of management Review,* 24**,** 711–24.
PERSSON, G. & AWALEH, F. Development and business relationships: A case study. 16th NOFOMA Conference, April 4-7 2004 Liköping, Sweden. Linköping University.
PILLER, F. & MOESLEIN, K. 2002. From economies of scale towards economies of customer integration. *Arbeitsbericht***,** 1–25.
PORTER, M. F. 1980. *Competitive Strategy,* New York, Free Press.
PROCKL, G., PFLAUM, A. & KOTZAB, H. 2012. 3PL factories or lernstatts? Value-creation models for 3PL service providers. *International Journal of Physical Distribution & Logistics Management,* 42**,** 544–61.
QUINTENS, L. & MATTHYSSENS, P. 2010. Involving the process dimensions of time in case-based research. *Industrial Marketing Management,* 39**,** 91–9.
RAGIN, C. C. 1992. "Casing" and the process of social inquiry. *In:* RAGIN, C. C. & BECKER, H., S. (eds.) *What is a case? Exploring the foundations of social inquiry.* Cambridge: Cambridge University Press.
RESCHER, N. 2006. *Process philosophical deliberations,* Heusenstamm, Walter de Gruyter.
RICHARDSON, G. B. 1972. The organization of industry. *The Economic Journal,* 82**,** 883–96.
ROTHBARD, M. N. 1995. *Making economic sense,* Auburn, Alabama, Ludwig von Mises Institute.
SARASVATHY, S. D. 2001. Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of management Review,* 26**,** 243–63.
SCANNELL, T. V., VICKERY, S. K. & DROGE, C. L. 2000. Upstream supply chain management and competitive performance in the automotive supply industry. *Journal of Business Logistics,* 21**,** 23–48.
SCHUMPETER, J. A. 1934. *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle*, Transaction Publishers.
SIGGELKOW, N. 2007. Persuasion with case studies. *Academy of Management Journal,* 50**,** 20–4.
SIMATUPANG, T. M., WRIGHT, A. C. & SRIDHARAN, R. 2002. The knowledge of coordination for supply chain integration. *Business process management journal,* 8**,** 289–308.

SMIRCICH, L. & STUBBART, C. 1985. Strategic management in an enacted world. *Academy of Management Review,* 10**,** 724–36.
SNEHOTA, I. 1990. *Notes on a theory of business enterprise,* Uppsala, Uppsala University: Department of Business Studies.
SOOSAY, C. A., HYLAND, P. W. & FERRER, M. 2008. Supply chain collaboration: capabilities for continuous innovation. *Supply Chain Management: An International Journal,* 13**,** 160–9.
SRAI, J. S. & GREGORY, M. 2008. A supply network configuration perspective on international supply chain development. *International Journal of Operations and Production Management,* 28**,** 386–411.
STABELL, C. B. & FJELDSTAD, Ö. D. 1998. Configuring value for competitive advantage: On chains, shops and networks. *Strategic Management Journal,* 19**,** 413–37.
STANLEY, L. L. & WISNER, J. D. 2001. Service quality along the supply chain: implications for purchasing. *Journal of Operations Management,* 19**,** 287–306.
STERN, L. W. 1969. *Distribution channels: Behavioral dimensions,* Boston, Houghton Mifflin.
STOCK, G. N., GREIS, N. P. & KASARDA, J. D. 1998. Logistics, strategy and structure: A conceptual framework. *International Journal of Operations and Production Management,* 18**,** 37–52.
STORER, C., HOLMEN, E. & PEDERSEN, A.-C. How well are chain customers known and understood? Exploring customer horizons. Industrial Marketing and Purchasing Asia Conference, 2002 Perth.
THOMPSON, J. D. 1967. *Organization in Action,* New York, McGraw-Hill.
TURNBULL, P., FORD, D. & CUNNINGHAM, M. 1996. Interaction, relationships and networks in business markets: an evolving perspective. *Journal of Business & Industrial Marketing,* 11**,** 44–62.
TWEDT, D. 1964. How stable are advertiser-advertising agency relationships? *Journal of Marketing,* 28**,** 83–4.
VAGHELY, I. P. & JULIEN, P.-A. 2010. Are opportunities recognized or constructed?: An information perspective on entrepreneurial opportunity identification. *Journal of Business Venturing,* 25**,** 73–86.
WALUSZEWSKI, A. 2006. Hoping For Network Effects Or Fearing Network Effects. *The IMP Journal,* 1**,** 71–84.
VAN DE VEN, A. H., EMMETT, D. C. & KOENIG JR, R. 1975. Frameworks for interorganizational analysis. *In:* NEGANDHI, A. R. (ed.) *Interorganizational theory.* Kent, OH: Kent State University Press.
VAN DE VEN, A. H. & POOLE, M. S. 2005. Alternative approaches for studying organizational change. *Organization studies,* 26**,** 1377–404.
VAN DER VALK, W. & WYNSTRA, F. 2005. Supplier involvement in new product development in the food industry. *Industrial Marketing Management,* 34**,** 681–94.
VAN MAANEN, J., SØRENSEN, J. B. & MITCHELL, T. R. 2007. The interplay between theory and method. *Academy of management review,* 32**,** 1145–54.
VAN STEKELENBORG, R. H. A. & KORNELIUS, L. A diversified approach towards purchasing and supply. Proceedings of the IFIP WG5. 7 Working Conference on Evaluation of Production Management Methods, 1994. North-Holland Publishing Co., 45–55.
WEICK, K. E. 1988. Enacted Sensemaking in Crisis Situations. *Journal of Management Studies,* 25**,** 305–17.
WEICK, K. E. 1995. *Sensemaking in organizations,* Thousand Oaks, CA, Sage.
WEICK, K. E. 2007. The generative properties of richness. *Academy of management journal,* 50**,** 14–9.

WHITE, L. H. 1990. Entrepreneurship, imagination and the Question of Equilibration. *In:* LITTLECHILDE, S. (ed.) *Austrian Economics*. Brookfield: Edward Elgar.
WILKINSON, I. & YOUNG, L. 2002. On cooperation: Firms, relations, networks. *Journal of Business Research,* 55**,** 123–32.
WILKINSON, I., YOUNG, L. & FREYTAG, P. V. 2005. Business mating: Who chooses and who gets chosen? *Industrial Marketing Management,* 34**,** 669–80.
WILLIAMSON, O. E. 1979. Transaction cost economics: The governance of contractual relationships. *Journal of Law and Economics,* 22**,** 233–61.
WILLIAMSON, O. E. 1985. *The economic institutions of capitalism,* New York, The Free Press.
WILLIAMSON, O. E. 1991. Strategizing, economizing, and economic organization. *Strategic management journal,* 12**,** 75–94.
YAO, Y., EVERS, P. T. & DRESNER, M. E. 2007. Supply chain integration in vendor-managed inventory. *Decision support systems,* 43**,** 663–74.
YIN, R. K. 2003. *Case study research: Design and Methods,* Newbury Park, Sage.

Appendix: List of anonymized suppliers

Technology area	Coded name	Working with FlexLink	Location	Comments
Plastic injection molding	IM1	2004-2008	China	Left for IM3.
	IM2	? –present	Sweden	Very long term relationship, high business volumes.
	IM3	2008-present	China	In China. Located farther than the other suppliers from FlexLink's sourcing unit in Shanghai.
	IM4	? –present	Sweden	Very long term relationship, high business volumes.
	IM5	2010-present	Sweden	Previously an AE2 supplier for plastic chains. Now FlexLink's supplier after acquisition of AE2.
	IM6	2011-present	Hungary	Relationship started to cover some of IM4's high volume products (plastic chains).
	IM7	?-2008	Denmark	Left for consolidation of supplies with IM2 and IM4.
Aluminum and zinc die casting	DC1	2004-present	China	Relationship gradually expanded over the years.
	DC2	? –present	Sweden	From the viewpoint of FlexLink, performs especially well in zinc die-casting.
	DC3	?-2010	Sweden	Relationship ended and volumes consolidated with DC1, DC2 and DC4, due to lack of scale.
	DC4	?-present	Sweden	Very long term relationship.
	DC5	2002-2004	China	Connected via IE1 for connecting strips. Not a very collaborative relationship.
Machining and stamping	MS1	? – 2006	Sweden	Production gradually moved to MS4, until the relationship ended.
	MS2	? –2005	Sweden	Production gradually moved to MS3, until the relationship ended.
	MS3	2005-present	China	Multiple product development projects with FlexLink. Connected sub-suppliers with FlexLink.
	MS4	2006-2013	Sweden/ China	Initially the relationship was established for low-cost manufacturing of pins and shafts, but later became problematic and ended (replaced by MS7).
	MS5	? –present	Sweden	Biggest machining supplier of FlexLink, long term relationship, high business volumes.
	MS6	? –present	Sweden	Very long term relationship, high business volumes.
	MS7	2013-present	China	Replaced MS4 to manufacture pins.

	MS8	?-2007	China	The initial machining supplier of FlexLink in China for manufacturing shafts. Left for MS4.
Stainless steel operations	SS1	2011-present	China	The ambitious and cooperative supplier that enabled FlexLink to produce low-cost and high quality stainless steel products.
	SS2	2010-present	Sweden	Manufactures drive units, designed by FlexLink. SS2 sells this item to other customers too.
	SS3	? –present	Sweden	FlexLink buys products from SS3's product catalogue with the FlexLink logo.
	SS4	2011-present	Austria	Relationship started due to the stainless steel project.
Nuts and bolts	NB1	? –present	Germany/ China	FlexLink had a relationship with NB1 in Germany before they connected DC1 to them in China.
	NB2	2002-2004	China	Connected via IE1 for nuts and bolts. Not a very collaborative relationship.
Bearings	BR1	? –present	Japan	FlexLink's assembly unit in Malaysia purchases bearings from BR1.
	BR2	? –present	Sweden	Most of the bearings used in FlexLink products are manufactured by this supplier in Sweden.
Import/ export agent	IE1	2002-?	Sweden/ China	The agent firm that facilitated the first purchases of FlexLink in China.
Aluminum extrusion	AE1		Sweden	Manufactures profile components for FlexLink.
	AE2	2010 - present	Sweden	A former supplier of FlexLink, which was acquired by FlexLink in 2010.
	AE3	2003-present	Sweden	Relationship started because FlexLink did not want to depend too much on AE4.
	AE4	? –present	Sweden	Very long term relationship, high business volumes.
Plastic extrusion	PE1	? –present	Sweden	Manufactures plastic extruded components for FlexLink with costly manufacturing processes.
	PE2	?-2011	Sweden	Left for PE4 due to some problems in the relationship.
	PE3	? –present	Sweden	Very long term relationship
	PE4	2010-present	Sweden	Replaced PE2, started in 2010 and the transfer of production was complete in 2011.
Plastic injection molding tools manufacturing	TM1	? –present	Sweden/ China	Tools supplier to IM2 and IM4, also in a relationship with FlexLink for technical discussions.
	TM2	2003-present	Sweden	Tools supplier to IM2 and IM4, also in a relationship with FlexLink for technical discussions.
	PR1	? –present	?	Supplier to IM2 and IM4, also in a relationship with FlexLink for new

				product development opportunities and technical discussions.
Plastic raw material manufacturing	PR2	? –present	?	Supplier to IM2 and IM4, also in a relationship with FlexLink for new product development opportunities and technical discussions.
Assembly guns manufacturing	AG1	2013-present	China	Manufactures assembly guns for FlexLink customers to use in assembling FlexLink components.
	AG2	?-2012	Sweden	Used to manufacture the assembly guns, but was left for AG1.
Surface treatment	ST1	2005-present	China	Sub-supplier to MS3 for nitrocarburizing operations.
Laser cutting	LC1	? –present	Sweden	Laser cutting and machining operations. The relationship was also used during the stainless steel new product development project for laser cutting stainless steel products.
Vacuum molding	VM1	? –present	Sweden	Low volume production, costly manufacturing process.
Motors manufacturing	MO1	? –present	Sweden	High business volumes.
Spiral Conveyors manufacturing	SC1	2008-present	Sweden	FlexLink purchases spiral conveyors from SC1's catalogue, high business volumes.