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Knowledge and Ignorance of Connections between Relationships

by

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Abstract

In this paper we review extant studies and report new empirical insights regarding connected relationships within a focal firm's network horizon. Furthermore, we discuss possible reasons for how and why knowledge and ignorance of different types of connections are dispersed in industrial structures.

The Industrial Network Approach and the concept of connected relationships

"One critical specification in all approaches developed to analyze managerial problems involves the interface between the firm and its environment" (Anderson, Håkansson and Johanson 1994, p. 2). The Industrial Network Approach as represented by e.g. Axelsson and Easton (1992), Håkansson and Snehota (1995), Ford (1997), and Dubois (1998) focuses explicitly on the interface between the firms and its environment, and it does so by having *business relationships* as the *focal unit of analysis*. However, within the Industrial Network Approach, as the name suggests, relationships are not the only unit of analysis paid attention to. The network structures of which relationships form part are an important unit of analysis. It may be argued that the most basic assumption within the Industrial Network Approach is that of business *relationships* being *connected* thereby giving rise to the type of industrial structure conceptualised as industrial *networks*.

The issue of connected relationships within the Industrial Network Approach seems to have been inspired by research within the field of sociology. Within Social Exchange Theory, Cook and Emerson (1978) discuss exchange networks as a set of two or more connected exchange relations. They define the concept of connection in the following way: *"Two exchange relations are **connected** to the degree that exchange in one relation is contingent upon exchange (or nonexchange) in the other relation. The connection is **positive** if exchange in one is contingent upon exchange in the other. The connection is **negative** if exchange in one is contingent upon nonexchange in the other"* (Cook and Emerson 1978, p. 725). Based on laboratory experiments regarding power, equity and commitment in exchange networks, Cook and Emerson (1978, p. 737) conclude *"Needed in place of a theory tied to perfectly competitive (i.e. uncommitted) markets is a theory of network structures tied together by repetitive exchange with specified partners."* Within Economic Sociology, Granovetter (1992, p. 33) discusses the same issue in terms of embeddedness, stating that *"'embeddedness' refers to the fact that economic action and outcomes, like all social action and outcomes, are affected by actors' dyadic (pairwise) relations **and** by the structure of the overall network of relations. ... The structural aspect is especially crucial to keep in mind because it is easy to slip into 'dyadic atomization', a type of reductionism."* Similarly, Grabher (1993) have seconded this view pointing out the problem of 'dyadic reductionism', i.e. treating a dyad as if it existed separate from its context. Hence, we may say that within the Industrial Network Approach, 'dyadic reductionism' is avoided by conceptualising relationships as being connected.

However, even though the concept of connection is important within the Industrial Network Approach, only a few studies have examined 'dyadic' business relationship in the context of other relationships. These studies have shown that firms (and relationships) do not exist in isolation, but rather that they are connected to a network context through direct and indirect

relationships (Laage-Hellman 1989; Axelsson and Easton 1992; Blankenburg 1992; Anderson, Håkansson and Johanson 1994; Havila 1996; Pedersen 1996; Ritter 1999 and Holmen and Pedersen 2000). This implies that in addition to characterising individual relationships, the studies have shown that single relationships are also affected by and affect developments in other relationships. Thus, a single business relationship exists both in itself and, at the same time, is embedded in a context, through its connections to other relationships. The purpose of this paper is to (a) review extant studies regarding connections between relationships and (b) report new insights into a focal firm's network horizon. Furthermore, we (c) discuss possible reasons for how and why knowledge and ignorance of different types of connections are dispersed in industrial structures, and (d) suggest how further research can be carried out into this phenomenon

What do we know about connections within the Industrial Network Approach?

Most empirical studies of connections within the Industrial Network Approach have started out by exploring which types of actors represent potential third parties to a relationship, i.e. affect and/or are affected by a focal business relationship. In her excellent licentiate thesis, Blankenburg (1992) studied 85 supplier-customer relationships in the IMP2 project. She uses the following classification of potential third parties: (1) supplier's suppliers, (2) competitive suppliers, (3) supplementary suppliers, (4) other customers, (5) customer's customers, (6) other units of the customer's firm, (7) other units of the supplier's firm, (8) bank or financial organisations, (9) law firms or legal organisations, (10) consultants or research institutes, (11) trade unions or other social bodies, (12) governmental agencies, (13) international organisations, and (14) other relevant organisations connected to a focal business relationship. Anderson, Håkansson and Johansson (1994) also focused on a focal dyadic relationship and potential connected third parties. They use the following categories: (1) supplier's supplier, (2) other supplier unit, (3) competing supplier, (4) supplementary supplier, (5) other customers, (6) customer's customer, (7) other units in focal customer firm, (8) other units in the focal supplier firm, (9) other ancillary firms and (10) third parties in common. Hence, Anderson, Håkansson and Johanson (1994) use fewer third-party categories than Blankenburg (1992) but, to a large extent, focus on the same types of third parties.

We may conclude that some insight has been gained into connected relationships and third parties. Firstly, we now know that more or less all types of organisations can be a *third party* to a connected relationship! Hence, *relationships* to all types of *third parties* may be *connected* to a focal *relationship*. Secondly, we know a little about how many connected relationships firms are aware of on average. The cross-sectional study by Blankenburg (1992) is the only one which has focused on this issue. In relation to 85 supplier-customer relationships, she identified 312 connected relationships in total - 101 connected via the supplier and 211 connected via the customer. This implies that, on average, firms are aware of 3.7 connected relationships/third parties, 1.2 connected relationships via the supplier and 2.5 connected relationships via the customer. It is, however, important to be aware that no specific counterparts were identified in the study by Blankenburg (1992). Instead, the respondents were asked to what extent any of the different third party categories presented above affected the two parties in the focal relationship, as seen from the supplier; if for example four customers of the customer affected the focal relationship, they would only count as one.

In addition to these two studies, research into connected relationships has been done within the fields of technical development, distribution and purchasing, respectively. Contrary to the above-mentioned studies, these studies employ a case methodology focusing on a few settings where specific connected relationships and third parties were studied and analysed. Laage-Hellman (1989) studied technological exchange between different firms and research units in industrial networks, and introduced the concept of *triad* as a first step towards a network analysis. With this as the point of departure, he analysed six empirical triad situations. In each of these he identified three specific counterparts in order to discuss how different counterparts were involved in technological development together with the focal firm, and how the focal firm's relationships to these counterparts were connected. On the basis of this analysis, he introduced two types of 'connection' concepts: activity-based connections, i.e. structural dependencies which exists among different activities (and the resources used in these activities), and actor-based connections, i.e., dependencies caused by actors' subjective acting within the given structure. Havila (1996) studied the changing role of intermediating actors in eleven non-overlapping international business-relationship triads, where each of the actors involved in the triads were identified. The main purpose of the study was to conceptualise different business-relationship triads, and how these change over time. Havila (1996) operated with two units of analysis: (1) the business-relationships triad, and (2) the role of the intermediating actor, and she related the changing nature of the second unit of analysis to changes in the first unit of analysis. On the basis of this, she distinguished between two types of triads: serial triads, i.e. where the supplier and the customer are connected through the intermediating actor and unitary triads, i.e. where all the three actors have relationships with each other. Havila (1996) did not explicitly discuss the concept of 'connection', but indirectly her discussion of triads contributed to the conceptualisation of connection within the Industrial Network Approach. Pedersen (1996) studied the development of supplier relationships and how these relationships were affected by connected relationships. In her study, she analysed three focal relationships each involving a focal firm and one of its most important suppliers. Furthermore, she studied how the development of these relationships was affected by different connected relationships to the focal firm or to the three suppliers (but always studied from the focal firm). On the basis of this Pedersen (1996) distinguished between effects of connected relationships in actor bonds, activity links and resource ties, as these are defined by Håkansson and Snehota (1995).

In all the three case studies above, the authors identify specific third parties as opposed to categories of third parties as distinguished in the cross-sectional study by Blankenburg (1992). Furthermore, both in Laage-Hellman (1989) and Pedersen (1996) the content of what is affected in the focal relationships is identified and analysed. However, we still know little about, (1) the types of third parties and connected relationships firms are aware of as well as (2) the types of third parties and connected relationships firms are not aware of. Furthermore, we know little about (3) the type and depth of knowledge firms have regarding third parties and connected relationships, since the studies presented above either focus on the quantitative aspects (how many connected relationships), or only draw attention to some of the involved firms direct and connected relationships. In other words, we still have very limited insight into the *network horizons* of firms as well as the *network contexts* of relationships, and how relationships connect to form network structures.

The network *horizon* of a firm is defined by Anderson, Håkansson and Johanson (1994, p. 4) as *"how extended an actor's view of the network is"*. As they argue (p. 4), *"actors have bounded knowledge about the networks in which they are engaged [..] . This is due to not only the network extending farther away from the actor but also the basic invisibility of*

network relationships and connections. The network setting extends without limits though connected relationships, making any business network boundary arbitrary." In addition to the concept of network horizon, Anderson, Håkansson and Johanson (1994, p. 4) discuss the concept of network *context*, which they define as: *"The part of the network within the horizon that the actor considers relevant is the actor's* ***network context****."* This view of network context is based on Håkansson and Snehota (1989, p. 192) claiming that *"it therefore seems useful to adopt the concepts of 'context' of an organization rather than its environment, when we want to refer to the entities that are related to the organization"*. Furthermore, is seems that the concept of *network context* of a focal *relationship* in which two firms are involved comprises all those other organisations which one or both firms are directly related to. This is depicted in figure 1.

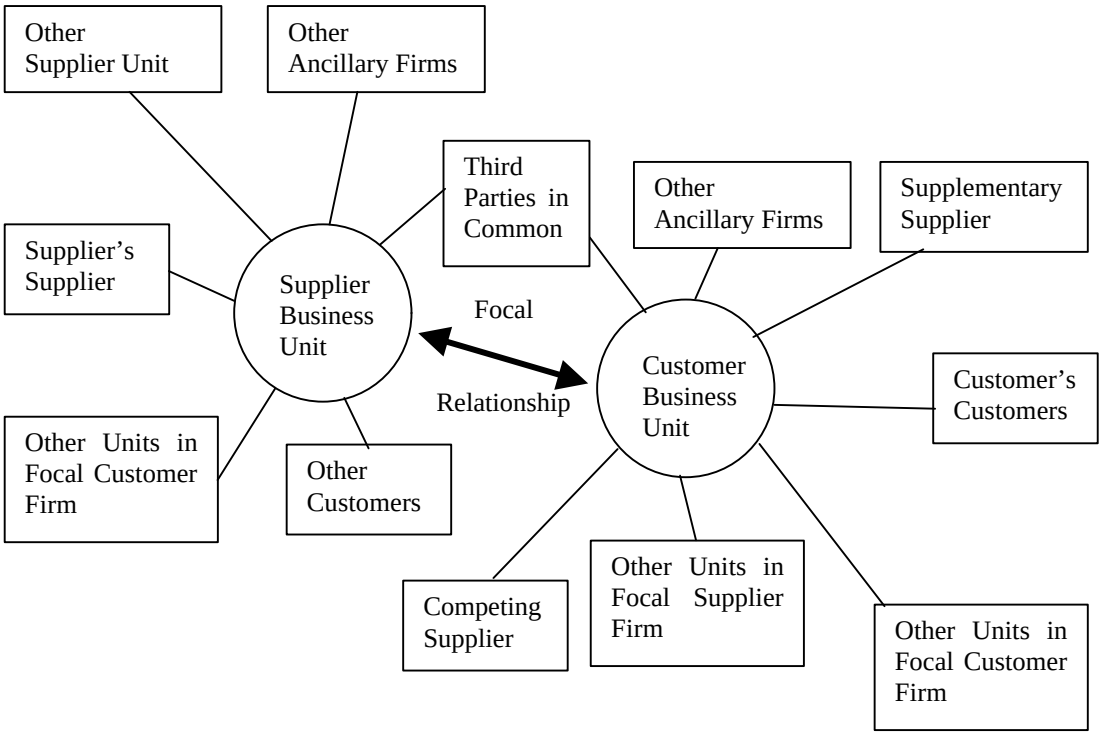

Figure 1: Connected relations for firms in a dyadic relationship
(Anderson, Håkansson and Johanson 1994, p. 3)

We may note that as opposed to Håkansson and Snehota (1989) who include only direct relationships in a *firm's* network context, Anderson, Håkansson and Johanson (1994) to some extent include all actors which the *firm* 'considers relevant'. As opposed to the concept of network context, the concept of *network horizon* seems to refer to *all* those relationships in which a single *firm* is directly involved as well as *all* those other firms and relationships which the single *firm* is *aware of*. This implies that also direct counterparts of the firm's direct counterparts may form part of a single firm's network horizon. Due to the lack of empirical evidence of connections between relationships, it is not surprising that little theorising has yet been carried out in relation to connections among relationships, network contexts as well as network horizons. However, we contend that researchers within the Industrial Network Approach should be interested in exploring and explaining such issues, as they concern the *sine qua non* of industrial networks. Hence, we may conclude that in spite of the importance of connections between relationships within the Industrial Network Approach, little attention has been paid to investigating and explaining connections, network contexts and network horizons. Hence, we suggest that further research is needed into these matters.

Main issue addressed in the paper

In this paper, we address one of these issues in particular – that of the *network horizon* of a firm. Furthermore, we opt for addressing this by means of a small exploratory study into the network horizon of a single firm. Hence, we aim to identify a focal firm's view of its network(s) and discuss how these findings may be explained. Thus, we decided to take the firm's direct relationships and the counterparts involved in these as the point of departure for the study. Furthermore, we decided not to focus on the connections between the focal firm's direct relationships, but on the contrary, we chose to focus on the focal firm's *awareness* of *counterparts of the direct counterparts*. Hence, the focus can be depicted as in figure 2:

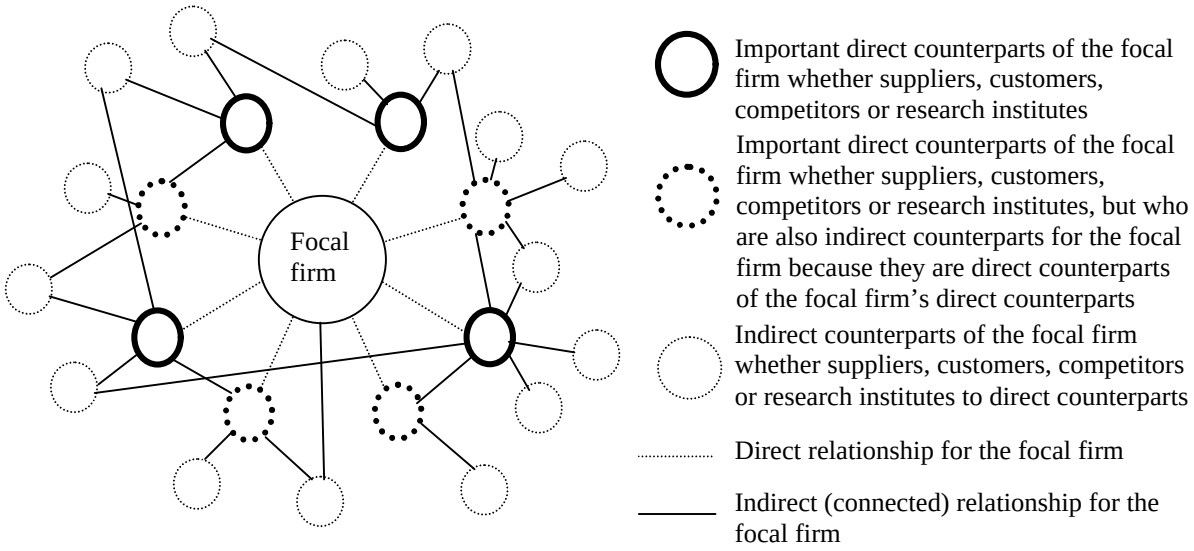

Figure 2: A focal firms awareness of counterparts of the direct counterparts

Only those third parties and connected relationships which a firm is aware of and has some knowledge about can be taken into account when co-ordinating economic activities. Hence, by focusing on the indirect (connected) relationships and third parties to a focal firm's relationships, we aim to get some insight into a focal firm's network horizon – how far does it extend into the network(s) it forms part of?

Methodological approach

In order to gain some preliminary insight into the *awareness and knowledge* of connected relationships and third parties possessed by a firm, we made an exploratory study of a small firm. Firstly, we had a personal, introductory meeting with the managing director and the technical director. Following the meeting, we were given a tour of the production of the firm, and additional information such as brochures, annual reports etc. was acquired. Having gained some insight into the firm, all the employees in the marketing and sales, the purchasing, the technology and process departments, in addition to the management team in the two different production departments were interviewed by telephone. These informants were chosen as their e-mail addresses appeared on the firm's homepage and, as such, were expected to have contact with the firm's counterparts. In total 16 persons were interviewed. The unit of analysis is the firm's network horizon of which only one was studied. Therefore, the type of generalisation aimed at in this study is *analytical generalisation* (Yin 1989).

All informants were asked about the firm's most important direct counterparts (suppliers, customers, competitors, research institutes etc.) in terms of purchasing volume, sales volume, and/or technical development. Having identified the most important counterparts, the informants were asked about (1) if they were aware of counterparts of the direct counterparts and, if so, (2) which specific counterparts' of the direct counterparts they were aware of. Following this, the informants were asked about:

(a) what the interaction between the direct counterpart and the third party consists of
(b) the amount of contact between the two parties
(c) the importance of the relationship for the firm's direct counterpart
(d) the importance and influence of the connected relationship for the focal firm
(e) if the focal firm affects the interaction between the two parties in the connected relationship
(f) if the focal firm interacts directly with the third party, and if so
(g) what the interaction between the focal firm and the third party consists of
(h) the extent of the direct contact between the focal firm and the third party
(i) the importance of the direct contact for the focal firm

One problem with designing a studying in this way, is that we can only describe the third parties and the connected relationships as they are seen from one of the parties involved, i. e. from the focal firm. This implies that we cannot identify types of third parties or connected relationships the firm is not aware of, since the awareness of the focal firm can not be related to the awareness of other firms in the network horizon. Furthermore, in some cases the informants were asked about what is going on in relationships between the firm's direct counterparts and the third parties in which the informants (and the focal firm) is not involved, and the importance of these relationships for the firm's direct counterparts. Hence, this information only represents the focal firm's perception of situations in which the focal firm is not directly involved.

Empirical findings – knowledge of connections and interaction with third parties

Based on the interviews, the picture illustrated in figure 3 (on the last page of the paper) could be drawn of the focal firm's main relationships and associated connected relationships within their network horizon. The figure shows: (1) the important direct counterparts of the focal firm, marked with solid-drawn and bold squares; (2) the important direct counterparts of the focal firm who are also indirect counterparts for the focal firm because they are direct counterparts of the focal firm's direct counterparts, marked with dotted and bold squares, and (3) the indirect counterparts of the focal firm, marked with dotted squares. In table 1, below the informants awareness of the focal firm's important direct counterparts as well as the focal firm's indirect counterparts is presented.

Number of important direct counterparts of the focal firm, which the informants were aware of	23
Number of important direct counterparts of the focal firm, but who are also indirect counterparts for the focal firm because they are direct counterparts to the focal firm's direct counterparts (third parties), which the informants were aware of	7
Number of indirect counterparts of the focal firm (third parties), which the informants were aware of	16
Number of indirect counterparts of the focal firm which the different direct counterparts have in common	None

Table 1: The focal firm's awareness of their direct and indirect counterparts

In table 2 below additional information is summarised. The table provides the following information: (a) the focal firm's direct counterparts, (b) the counterparts of the focal firm's direct counterparts (third parties), (c) the content of the interaction between the focal firm's direct counterparts and the third parties (seen from the direct counterpart), (d) the importance of the contact seen from the focal firm, (e) the content of the direct interaction with third party, and (f) the importance of the contact with the third party (for the focal firm).

Focal firm's direct counterparts	Counterparts of the focal firm's direct counterparts (third parties)	Content of interaction (seen from the direct counterpart)	The importance of the contact seen from the focal firm	Content of direct interaction with third party	The importance of contact with the third party (for the focal firm)
QFX (C)*	ASL	Design and development	Low	No interaction	
	SIK	Supply of components	Low	No interaction	
	IPB	Design and development	**High**	**Development**	**High**
	SAP	Supply of components	**High**	**Development**	**High**
	NOK	Design and development	Some	Logistics	Some
	ECU	Supply of components	Low/some	Logistics	Some
	SOS	Supply of components	**High**	**Development**	**High**
	MIB	Supply of components	**Some**	**Development**	**High**
	KOI	Supply of components	**High**	**Development**	**High**
	VEB	Design and development	Some	No interaction	
	BOS	Design and development	High	No interaction	
EMQ (C)	COI	Supply of materials	Low	Logistics	Low
	MTA	Supply of components	Low	No interaction	
EMA (C)	LTI	Supply of materials	Some	Logistics	Low
	DUN	Supply of materials	Low	Logistics	Low
AUP (C)	ALR	Supply of components	Low	No interaction	
	NOV	Supply of components	Low/some	Logistics	Low
	POV	Supply of components	Low	Logistics	High
NEI (C)	KAT	Supply of components	Some	No interaction	
	AIG	Supply of components	Some	Logistics	Low
KDF (C)	AUE	Design and development	**Some**	**Development**	**High**
KKI (C)	None identified				
NAT (C)	None identified				
ARI (S)	PHT	Supply of components	Some	No interaction	
MIB (S)	MEI	Supply of equipment	High	No interaction	
SMI (S)	None identified				
CYJ (S)	None identified				
LSU (S)	None identified				
MIS (S)	None identified				
KCB (S)	None identified				
MOJ (S)	None identified				
ESL (S)	None identified				
COI (S)	EMQ	See EMQ above			
LTI (S)	EMA	See EMA above			
DUN (S)	EMA	See EMA above			
NOK (S)	QFX	See QFX above			
KOI (S)	QFX	See QFX above			
NOV (S)	AUP	See AUP above			

* (C) = Customer (S) = Supplier

Table 2: Description of the direct and connected relationships

Analysis and discussion

First of all we can observe, from table 1 above, that the focal firm, on average, is aware of 1.0 connected relationship/third party per direct counterpart, since the number of important direct counterparts of the focal firm is 23, and the total number of indirect counterparts of the focal firm also is 23. This average differs from the average of 2.5 connected relationships/third parties connected via the customer reported in the study by Blankenburg (1992). One reason for the difference may be that we have asked the informants to name the third party, whereas Blankenburg (1992) formulated her questions (one question regarding the focal firm's awareness of a specific customer's third parties and one question regarding the focal firm's awareness of their own direct counterparts which could affect the relationship with the specific customer) in the following way: *"To what extent is your business with this customer affected by his own/your own relationships with any specific of the following parties?"* The possible answers were the fourteen different *categories* of third parties presented earlier in the paper. Thus, we suggest that it is easier for a firm to identify a category of third parties than to name a specific firm. However, if the ambition with studying connected relationships is to acquire knowledge regarding different ways for a firm to manage interdependencies between relationships we need to know more about the third party than that it is 'a customer'.

In the study by Blankenburg (1992) it is also impossible to identify how many third parties for each direct counterpart a firm has knowledge about, and how this knowledge is distributed between e.g. the focal firm's ten most important suppliers, ten most important customers etc. In our case we can observe that the number of third parties the focal firm is aware of do not decrease linearly, i. e. from most knowledge about the most important counterpart (for example in the terms of purchasing or sales volume), to less knowledge about the least important counterpart. Furthermore, we can observe that the focal firm's knowledge about connected relationships and third parties almost exclusively concerns counterparts of the firm's customers, and specifically other suppliers of the focal firm's customers. One reason for this may be that the focal firm sometimes has to co-ordinate with some of their customers' other suppliers to make the products they deliver closely complementary to the products of other supplementary suppliers and to the common customer. This can also be related to the fact that of the 23 *indirect* counterparts of the focal firm which are identified, seven of them were also important *direct* counterparts of the focal firm, showing that the focal firm has *direct relationship* with approximately 30 % of the third parties identified. A last comment on the study by Blankenburg (1992) is that her way of categorising different third parties does not allow identification of third parties in common for the focal supplier and the focal customer, which is one important category pointed out by Anderson, Håkansson and Johanson (1994) in figure 1.

In our study, we investigated if the focal firm's direct counterparts had any counterparts in common (except for the focal firm). We did not find any indirect counterparts of the focal firm which the different direct counterparts had in common. This implies that the focal firm was not aware of any overlap between its different direct counterparts' counterparts except for some large multinational firms which deliver to 'all' firms within the industry.

If we look at the last three columns in table 2 we can see (1) the importence of the contact between the focal firm's direct counterparts and the third parties (as seen from the focal firm), (2) the content of the direct interaction between the focal firm and the third parties, and (3) the importance of the contact between the focal firm and the third parties. If we relate the information in these tree columns, we can observe the following pattern; if (1) is 'some' or

'high' and (3) is 'high', the interaction between the focal firm and the third party is about product and/or process development, new designs etc. (as opposed to more purchasing/sales/logistics activities). From these observations it seems like connected relationships regarding development is considered to be of more importance for the focal firm regardless of what is going on in the relationship between the focal firm's direct counterparts and these counterparts' third parties.

By making this small empirical study, we have tried to get an overview of a focal firm's knowledge of connected relationships and third parties and the type of knowledge and possible direct interaction the focal firm had with these third parties. Having acquired an empirical basis, however limited, has made us speculate on possible explanations for the focal firm's relatively limited knowledge of and interaction connected relationships and third parties. In other words, taken from Jan Johanson, the empirical findings have given rise to some thoughts on reasons for the empirical findings.

The division of knowledge and the division of labour

One first question which may be posed is: 'Why is there a division of knowledge?' In other words, 'why do everyone not know everything?' This may seem as a completely futile question, however, even so, when considering how knowledge has been treated within the discipline of economics over time, the question may appear less pointless. The assumption of perfect information freely available to everyone has, after all, been widely used for explaining industrial structures such as (hypothesised) markets. One place to start when discussing this may be Loasby (1999) and his book 'Knowledge, Institutions and Evolution in Economics'. Loasby (1999, p. 50) argues that *"the principal cause of the division of knowledge was the division of labour; for knowledge grows by division"*. Let us first inquire into the division of labour to which attention was drawn by Smith (1776).

Smith (1776) proposes that the primary cause of wealth and improvement in the productive powers of labour is the *division of labour*. By dividing work among individuals, firms as well as nations, it is possible to increase the quantity of work which can be carried out by any given number of individuals, firms or nations. Smith (1776, p. 112-113) argues that there are three general circumstances underlying the rise and advantages of the division of labour. Although he primarily discusses these three circumstances in relation to individuals, they are also supposed to apply to firms and nations. Firstly, the division of labour enables an increase in the dexterity (skilfulness) of all workmen. As Smith (1776, p. 113) proposes *"The improvement of the dexterity of the workman necessarily increases the quantity of the work he can perform; and the division of labour, by reducing every man's business to one simple operation, and by making this operation the sole employment of his life, necessarily increases the dexterity of the workman"*. Secondly, by dividing work among individuals, it is possible to save the time commonly lost when passing from one type of work to another. As Smith (1776, p. 113) suggests *"a man commonly saunters a little in turning his hand from one sort of employment to another. When he first begins the new work he is seldom very keen and hearty; his mind, as they say, does not go for it, and for some time he rather trifles than applies to good purpose.* Thirdly, the division of labour has enabled the invention of machines which make it possible to increase the quantity of output which one individual can make. The inventing, in turn, is enabled by the division of labour partly as *"men are much more likely to discover easier and readier methods of attaining any object when the whole attention of their minds is directed towards that single object than when it is dissipated*

among a great variety of things" (Smith 1776, p. 114). However, the invention of machines is also partly due to another type of division of labour which is not related to those who *use* the particular machines when carrying out a particular productive activity but, on the contrary, to *"makers of the machines, when to make them became the business of a peculiar trade"* (Smith 1776, p. 115). Specialisation, or skilfulness within a particular area, is assumed to be a *consequence* of the division of labour – not only a point of departure for dividing labour. As Smith (1776, p. 120) argues *"the difference of natural talents in different men is, in reality, much less than we are aware of; and the very different genius which appears to distinguish men of different professions, when grown up to maturity, is not upon many occasions so much the cause as the effect of the division of labour."* Hence, dexterity, skilfulness, and competence arise in relation to the particular specialisms or foci which individuals, firms or nations pursue over a period of time. Hence, as Loasby (1999) points out, division of knowledge and ignorance is a consequence of the division of labour.

Exchange and co-ordination

A particular specialism is only meaningful to the extent that it is complementary to - useful for - other specialisms. As Smith (1776, p.118) notes *"nobody ever saw a dog make a fair and deliberate exchange of one bone for another with another dog"*, but as opposed to other races of animals, human beings have a particular propensity – namely, "*the propensity to truck, barter and exchange one thing for another"* (Smith 1776, p. 117). Therefore, "*among men [..] the most dissimilar geniuses are of use to one another; the different produces of their respective talents, by the general disposition to truck, barter, and to exchange, being brought, as it were, into a common stock, where every man may purchase whatever part of the produce of the other men's talents he has occasion for"* (Smith 1776, p. 121). In other words, *exchange* is a prerequisite for the usefulness of the division of labour; if exchange was impossible, the division of labour would be equally so. Furthermore, the division of labour, which can be profitably pursued, is assumed to be 'limited by the extent of the market'. Smith (1776, p. 12) argues that *"as it is the power of exchanging that gives occasion to the division of labour, so the extent of this division must always be limited by the extent of that power, or, in other words, by the extent of the market."* Hence, the division of labour is assumed to arise in relation to the *quantity* of the demand for the specialised produce of individuals, firms or nations. On markets, the demand and supply of homogeneous products, i.e. the outputs of and inputs for specialised individuals and firms, are quantitatively adjusted to one another on the basis of price signals, as money is perfectly divisible. Furthermore, it has generally been assumed that markets which are characterised by *perfect competition* are advantageous for society in the sense that they rule out the existence of monopolies as well as collusion among small number of buyers or sellers, respectively. Perfect competition is defined as *"the existence of many buyers and sellers of each homogeneous commodity and by the absence of any artificial restraints upon their activities"* (Richardson 1960, p. 7). Hence, markets offer a particular type of *co-ordination* for the exchange among individuals or firms namely that of *spontaneous co-ordination* of homogeneous products, and neither buyers nor sellers accept any obligations with regard to their future conduct.

However, other types of co-ordination are possible than co-ordination via markets. As Coase (1937) points out, some co-ordination takes place *within firms*, where the price mechanism is superseded by authority, or direction, or norms due to the advantages offered in terms of lower transaction costs and flexibility. As Coase (1937) argues, in order for exchange to take place in markets, contracts regulating and specifying the exchange need to be devised.

However, in cases where a particular factor of production is required repeatedly, it is possible to have only *one contract* with the supplier of that factor of production *within* a firm as opposed to the *series of contracts* which would be required if the exchange was to take place on markets. The types of contract used within a firm also have the advantage of reducing the need for precise forecasts and, as such, the need for knowing precisely which particular factors of production, in which particular quantities will be required at which particular points in time. Therefore, as Coase (1937, p. 392) proposes, *"a firm is likely therefore to emerge in those cases where a very short term contract would be unsatisfactory"*. Hence, Coase focuses on *two* types of co-ordination: direction and market exchange, of which only the latter concerns co-ordination across firm boundaries. However, co-ordination across firm boundaries may take place via *co-operation* or *relationships*.

Richardson (1972) was among the first who discerned between *three* types of co-ordination: market transactions, direction (i.e. hierarchy) or co-operation. Richardson (1960) points to the need for *quantitative* as well as *qualitative information ex ante* about the plans of other firms for making decisions – and the inability of perfectly competitive markets to provide such information. He argues that in order to make decisions which would lead to equilibrium, business men would need to form expectations about the probable responses of other business men and firms. Such expectations would concern the probable responses of other firms which may be contemplating (a) 'competitive investments' or (b) 'complementary investments' in (x) production capacity aimed at producing given products as well as in (y) the development of and production capacity for new products. Hence, although Richardson do recognise that collusion among business firm may be harmful for society, Richardson's main argument is that implicit or explicit *collusion* (i.e. co-ordination or relationships) among business firms is also *beneficial* for society – if there is no such collusion, investment will frequently prove either unprofitable and/or not be made. Voilá – the societal tolerability of co-ordination across firm boundaries. This is in line with the argument by Loasby (2000, p. 150) who states that *"the need to obtain 'market information' before business men could make reasoned commitments to investments programmes had [..] led him* (i.e. Richardson) *to the conclusion that the anonymity of all transactions, which had been considered essential to perfect competition, is incapable of supporting intelligent decision-making."* Later on, Richardson developed his ideas into an analytical framework which explicitly defines in which cases inter-firm co-ordination should be undertaken *ex ante* – where *activities are closely complementary and dissimilar and associated with economies of scale* (Richardson 1972).

Merits of markets and relationships for ignorance and co-ordination of knowledge

By focusing on 'partial knowledge and ignorance' and the necessity to keep cognitive loads within bounds, Loasby (1999) aims to explain the existence and structure of institutions such as *firms*, *markets* and, to some extent, *relationships* between firms. His main argument seems to be that the institutions mentioned above emerge in order to allow society at large to *economise* on knowledge and to *develop* new knowledge – as well as in order to handle uncertainty and change. As he argues (1999, p. 3), the complexity of the universe is so huge that it neither can be grasped by a single 'mind' nor by a single 'organisation'. Complexity coupled with uncertainty and change leads to the emergence of institutions, which may enable industrial actors to make choices and carry out industrial activities under conditions of bounded cognition and knowledge. As Loasby (1999, p. 12-14) proposes, choices and decisions require 'closure' - of actors' representations of empirical phenomena which cannot be so isolated. Thereby, all 'closures' or ways of 'framing' situations are to some degree false

but, nonetheless, imperative for the carrying out of industrial activities. As Loasby (1999, p. 11) argues, "*viable processes must operate within viable boundaries; in human affairs these boundaries limit our attention and our procedures to what is manageable without, we hope, being disastrously misleading – though no guarantees are available"*. One consequence of the need for framing is the division of labour as well as the emergence of *firms* with emerging idiosyncratic capabilities.

However, as explained earlier, decentralisation – the splitting up of planning and activity into firms - requires *co-ordination* between firms and their idiosyncratic capabilities. Thereby, a consequence is the emergence of *co-ordination mechanisms* among firms. Co-ordination requires that the boundaries of firms need to be permeable, i.e. they need to relate and not (only) separate the division of labour between firms. As Loasby (1999:6) formulates it, the problem to be solved is the following: *"how can we know what other people are intending to do, and how can we bring the relevant pieces of individual knowledge into alignment?"* In other words, relating this to co-ordination between firms, 'how can ignorance be allowed and knowledge be co-ordinated in economic systems?' One mechanism co-ordinating activities, exchange and investment across firm boundaries is (competitive) *markets*, another is *relationships*. Let us first look into markets.

When discussing the above-mentioned problem of alignment or co-ordination, Loasby (1999) draws, among other sources, on Hayek (1945) who focuses his attention on the economic *"problem of the utilisation of knowledge not given to anyone in its totality"* (1945:520). He argues that an economic system (or society) works *"not because any of its members survey the whole field, but because their limited individual fields of vision sufficiently overlap so that through many intermediaries the relevant information is communicated to* ***all****"* (Hayek 1945:526: emphasis added) and the importance of recognising *"the unavoidable imperfection of man's knowledge and the consequent need for a process by which knowledge is constantly communicated and acquired"* (Hayek 1945:530). However, as Loasby (1999) argues, Hayek (1945) focuses on the merits of *perfectly competitive markets* in supplying quantitative indices (prices) in which all the relevant information is concentrated (Hayek 1945:525). In other words, Hayek (1945) draws attention to the 'marvel of the price system' which he regards as *"a mechanism for communicating information"* (Hayek 1945:526). The marvel of the price system, in turn, is primarily related to *"the economy of knowledge with which it operates, or how little the individual participants need to know in order to be able to take the right action"* (Hayek 1945:527).

The price system is closely related to (the analytical fiction of) perfectly competitive markets. Loasby (1999) argues that perfectly competitive markets, however, are assumed to be 'quite inappropriate' for handling a large part of the necessary co-ordination between firms. Price information is not the only matter of concern. At the very least, perfectly competitive markets need be complemented by some other kind of 'markets' – other co-ordination mechanisms. Loasby (1999) bases his critique of perfectly competitive markets on Richardson (1960) and Richardson (1972), whom Loasby (1999, p. 7) suggests should be given the primary credit *"for investigating possible solutions, and for demonstrating in the process that perfect competition is quite inappropriate as a way of even thinking about it."* The problem being, as stated above, *"how can we know what other people are intending to do, and how can we bring the relevant pieces of individual knowledge into alignment?"* (Loasby 1999, p.6). Let us look into the arguments put forward by Richardson – which will lead us to the second co-ordination mechanism mentioned earlier, i.e. *relationships*.

The title originally intended for Richardson's (1960) book Information and Investment was 'The Economics of Imperfect Knowledge'. On the first page, Richardson formulates his main purpose of the book: *"'The general equilibrium of production and exchange', I shall contend, cannot properly be regarded as a configuration towards which a hypothetical perfectly competitive economy would gravitate or at which it would remain at rest. In support of this, it will be pointed out that entrepreneurs could rationally decide upon the activities required of them only if possessed of a certain minimum amount of relevant information. The degree to which this information is available to them can be shown to depend, moreover, on the nature of the market or the economic system within which they are presumed to operate. Perfect competition, I shall affirm, represents a system in which entrepreneurs would be unable to obtain the minimum necessary information; for this reason, it cannot serve as a model of the working of actual competitive economies"* (Richardson 1960, p. 2). Following Richardson (1960) and (1972), Loasby argues that firms' boundaries need not only be permeable to information exchanged on 'markets' but also to information exchange in more dense relationships. Furthermore, as he assumes the universe to be in constant flux, relationships between firms need to be able to handle the *continuous* co-ordination of the dispersed knowledge among firms – in such a way that economising on knowledge and development of knowledge can be achieved. Loasby (1999) also rejects the possibility of replacing the inter-firm co-ordination with intra-firm co-ordination (i.e. by vertically integrating hitherto individual firms). Although it is beyond the purpose of the present paper to elaborate on the arguments against vertical integration at length, we may touch upon them by restating Loasby's argument that *"many of the capabilities which a firm requires must be left outside its control if they are to continue to develop. Capabilities must remain distributed; what the firm needs is access to these capabilities"* (Loasby, 1999 p. 96). Summing up, we may say that although it may be that economic systems should economise on knowledge, as Hayek (1945) points out and explains in terms of 'the marvel of the price system', the price system (or rather competitive markets) is not sufficient for co-ordination across firm boundaries – at least not if the goal is equilibrium, as pointed out by Richardson (1960). Furthermore, as Loasby (1999) seems to points out, an economic system which can economise on bounded cognition (knowledge), development of knowledge, and co-ordination needs to comprise firms, markets *and* relationships. In other words, it needs to allow ignorance and enable development in a changing world.

The Industrial Network Approach revisited

Let us now return to the theoretical basis which we started out with – the Industrial Network Approach. Firstly, we may observe that many of the arguments by Loasby and Richardson in the preceding sections are quite compatible with the Industrial Network Approach. Furthermore, Dubois (1998) is based on Richardson (1972), and reference to his 1972 article is relatively often made by researchers within the approach.

As mentioned earlier, Loasby (1999) suggests that *firms*, *markets* and *relationships* emerge in order to allow society at large to *economise* on knowledge (allow ignorance), to *develop* new knowledge, as well as in order to handle uncertainty and change. In the Industrial Network Approach, the possibility of *developing* knowledge and other resources through relationships has been discussed considerably, e.g. Håkansson (1989), Håkansson (1993), Håkansson (1994), Håkansson and Snehota (1995), Ford et al. (1998). In order to enable development of knowledge, some substance is required in relationship – actor bonds allowing uncertainty to be handled, activity links implying that a certain volume is involved, and resource ties

enabling combining and adapting knowledge and tangible resources across firm boundaries. If we look at the need for *economising*, it has primarily been discussed in terms of costs related to relationships and connections among them. Håkansson (1994, p.262) argues that there are two sources of costs (a) relationships to single counterparts and (b) co-ordination of relationships. Furthermore, the costs (as well as revenues) *"for a company, for a specific relationship, depends on (1) the intensity of the relationship, (2) how it is connected to other relationships which (a) the focal company has, i.e. how well this relationship fits into the focal company's set of relationships, and (b) the counterpart has, i.e. how well the relationship fits into its set of relationships"* (Håkansson 1994, p. 264). It is also argued that there is a limit to the number of relationships a single firm can have, the reason being that "*resources are needed to create closeness to counterparts. Given the limit of the total resources, close relationships can only be created with a limited number of counterparts"* (Håkansson 1994, p. 261). Furthermore, Håkansson (1994) also seems to argue that the more relationships a single firm has, the more costs of co-ordinating (connecting) them. *Ignorance*, on the other hand, is generally not discussed to any considerable extent. However, Håkansson (1993) may seem to touch upon the issue when discussing specialisation and utilisation of the heterogeneity of counterparts (and their resources). He mentions that *"the heterogeneity is probably on such a level that it is overwhelming for every single company. There is no possibility for each of them to 'utilize' all of it. The question is more one of selecting some aspects and ignoring others"* (Håkansson 1993, p. 214). We may tentatively conclude that, within the Industrial Network Approach, knowledge and development has been paid more attention than economising, and ignorance even less. This attention paid to development may be related to the view of industrial networks as dynamic systems, which always are 'sub-optimal', where actions aimed at improving some parts of the systems, but never gravitating towards equilibrium. However, 'industrial networks' is regarded as a co-ordination mechanism, which co-ordinates complementary, and (perhaps) to some extent competitive, investments and activities, and the possibility of negative effects from collusion may even be considered (Håkansson 1993, p. 221) although in a somewhat different manner than discussed by Richardson (1960).

When it comes to the connections which a single firm is assumed to be involved in, and pay attention to, it has been suggested that "s*ome recent developments in business practice, however, strongly suggest that the connections* ***between*** *a firm's dyadic relations are of growing interest"* (Anderson, Håkansson and Johanson 1994, p. 1, emphasis added). Furthermore, they discern between primary and secondary functions of a relationship. *"By primary functions, we mean the positive and negative effects on the two partner firms of their interaction in a focal dyadic relationship. The secondary functions, also called network functions, capture the indirect positive and negative effects of a relationship because it is directly or indirectly connected to other relationships. However, in a given relationship, secondary functions can be as important as the primary ones, or even more so"* (Anderson, Håkansson and Johanson 1994, p. 3). Having stressed the importance of secondary functions of relationships, i.e. connections, Anderson, Håkansson and Johanson proceed with establishing constructs which capture the connectedness of a focal relationship. These constructs, however, *"capture the connectedness of the focal relationships, as perceived by each partner"* (Anderson, Håkansson and Johanson 1994, p. 7), and the measures suggested for capturing the constructs only relate to connections among the direct relationships of a single firm. They do not conceptualise a 'joint assessment' of the focal relationship's connectedness – even if the authors mention that their approach to the context of a relationship differs from the sum total of two organization-sets, the latter concepts having

been proposed by Aldrich and Whetten (1981). It is not made completely clear how they differ; however, the difference may regard 'third parties in common'.

Concluding discussion and theorising

In this paper, the discussion has centred on the issue of connections between relationships and the knowledge and ignorance of such connections. We made a study of a single firm, and based on the findings from the empirical study, we inquired into the theorising by Loasby, Richardson and the Industrial Network Approach primarily represented by Håkansson. The primary empirical finding we wanted to discuss was 'how may it be that our small firm (a) know so relatively little about relationships which are connected to its direct relationships and the third parties involved in them, and (b) that it only interacts directly with some of those third parties which it knows of?' On the basis of inspiration from the discussed sources within and outside the Industrial Network Approach, we suggest the following as an explanation to the questions formulated above.

Industrial networks as connected relationships is a co-ordination mechanism which allows for *economising* on the co-ordination of knowledge not given to any single firm but which is beneficial to co-ordinate - for firms as well as for society at large. The possible detrimental effects arising from a single firm (a) not fully knowing how its relationships to direct counterparts are connected to other relationships of its immediate counterparts, and (b) not always being directly involved in making connections among relationships, are mitigated by their direct counterparts performing a connector function – involving competitive as well as complementary aspects. Hence, given that a single firm has relationships to other firms which, similarly, are involved in other (hence, connected) relationships, it can allow itself (also) to be partially ignorant about the industrial network of which it forms a part. This is possible if the direct counterparts performs a joining (enabling direct co-ordination on a limited number of issues), a relating (enabling co-ordination between the focal firm and a third party via the counterpart) as well as a mediating function (enabling co-ordination between the focal firm and the third party without them having any knowledge of each other). These three functions are depicted in figure 4:

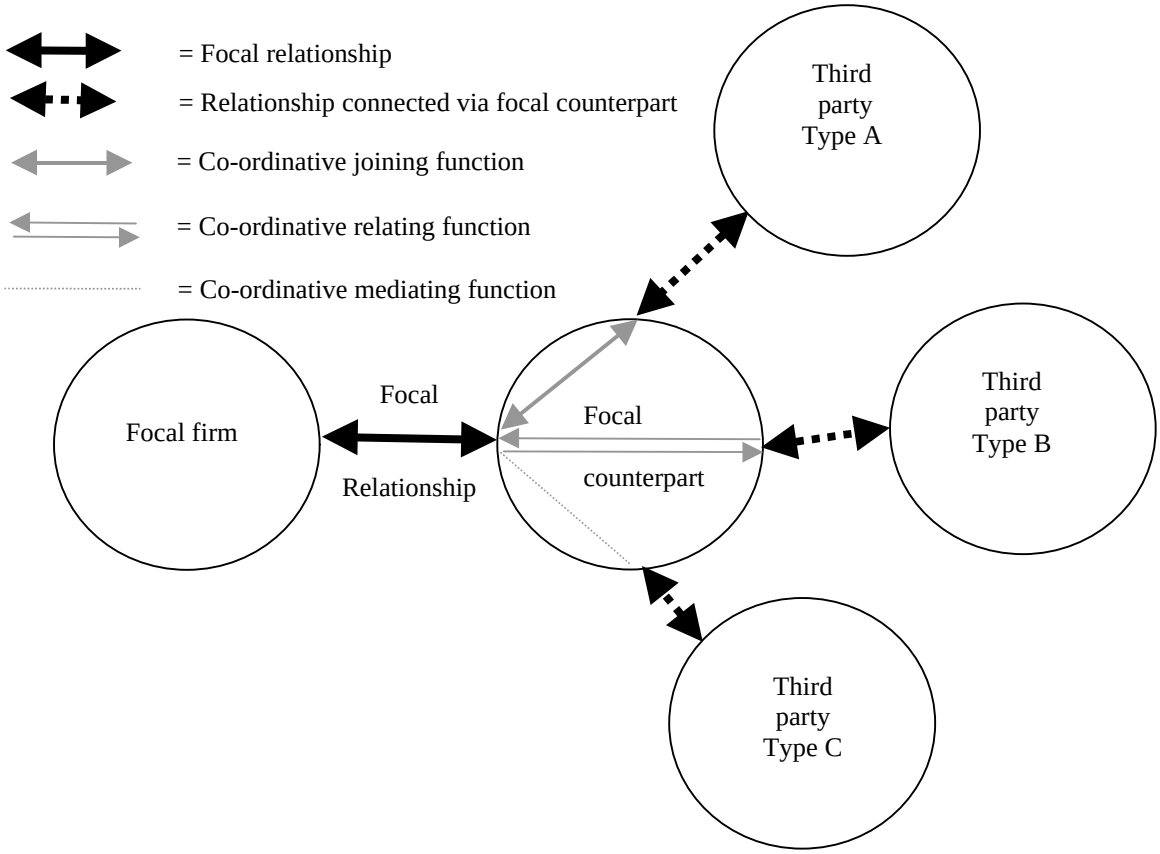

Figure 4: The three connector functions of a direct counterpart

However, not only is economising and ignorance possible, a structure in which counterparts performs such functions, *knowledge development* is possible in a dynamic way. The parties in relation to which an actor performs the connector functions mentioned above may become more closely related at later points in time – either due to their common counterpart directly enabling the development of an actual relationship between the two parties, or by the two parties doing so on their own initiative. 'Weak ties' may develop into strong ones, and vice versa. The primary function of 'the networking firm' may be to connect its direct relationships in various ways, the primary purpose of 'industrial networks', in turn, may be to allow for various connector functions of many firms being 'confronted' or 'related' in relationships, which then obviously have two sides. By taking this into consideration, we would actually expect that a single firm (a) is directly involved with a small number of their counterparts' other counterparts on some issues, (b) have some knowledge of and can indirectly influence a relatively small number of their direct counterparts', and (c) has no knowledge about a large part of their direct counterparts' other relationships. Such findings and suggestions have implications for managers. They should consider their knowledge and ignorance regarding connections and third parties to the relationships in which their firms are involved. Our small firm may not be so bad off – but it should consider its 'network horizon' in light of the suggested explanations - which and how much knowledge of connections to which third parties would it like to have?

In summary, we suggest that connections between relationships and the division of knowledge and relative ignorance of these connections among firms may be a consequence of industrial networks being a structure which enable an emergent economy of the division-of-

knowledge, co-ordination of this knowledge and development of new knowledge, relationships and other resources.

References

Aldrich, Howard and David A. Whetten (1981) "Organization-sets, Action-sets, and Networks: Making the Most of Simplicity" in Handbook of Organizational Design, Paul C. Nystrom and William H. Starbuck, eds. New York: Oxford University Press, 385-408.

Anderson, James C., Håkan Håkansson and Jan Johanson (1994) "Dyadic Business Relationships within a Business Network Context", Journal of Marketing, October, 58, 1-15.

Axelsson, Björn and Geoff Easton (eds.) (1992) Industrial Networks: A New View of Reality. London: Routledge.

Blankenburg, Desirée (1992) Kopplade Relationer i Industriella Nätverk, Licentiate thesis, Uppsala University. Uppsala: Department of Business Studies.

Coase, Ronald H. (1937) "The Nature of the Firm", Economica, N.S.4, 386-405.

Cook, Karen S. and Richard M Emerson (1978) "Power, Equity and Commitment in Exchange Networks", American Sociological Review, Vol. 43, 721-739.

Dubois, Anna (1998) Organising Industrial Activities Across Firm Boundaries. London: Routledge.

Ford, David I. (ed.) (1997) Understanding Business Markets (2nd edition). London: The Dryden Press.

Ford, David I., Lars-Erik Gadde, Håkan Håkansson, Anders Lundgren, Ivan Snehota, Peter Turnbull, and Dave Wilson (1998) Managing Business Relationships. Chichester: John Wiley & Sons Ltd.

Grabher, Gernot (ed.) (1993), The Embedded Firm. London: Routledge.

Granovetter, Mark (1992), "Problems of Explanation in Economic Sociology", in Networks and Organizations: Structure, Form and Action, Nitin Nohria and Ronald Eccles, eds. Boston: Harvard Business School Press.

Havila, Virpi (1996), International Business-Relationship Triads - A Study of the Changing Role of the Intermediating Actor. Ph.D. thesis, Uppsala University. Uppsala: Department of Business Studies.

Hayek, Friedrick von (1945) "The Use of Knowledge in Society", The American Economic Review, XXXV (September), 519-530.

Holmen, Elsebeth and Ann-Charlott Pedersen (2000) "Avoiding Triadic Reductionism: Serial Tetrads - a Useful Concept for Studying Connected Relationships?" in Proceedings from the 16th IMP International Conference, Bath, September, 1-18.

Håkansson, Håkan (1989) Corporate Technological Behaviour: Co-operation and Networks. London: Routledge.

Håkansson, Håkan (1993) “Networks as a Mechanism to Develop Resources”, in Networking in Dutch industries, in P. Beije, J. Groenewegen and O. Nuys eds., Apeldoorn: Garant, 207-223.

Håkansson, Håkan (1994) “Economics of Technological Relationships”, in Economics of Technology, O. Grandstrand (ed.), Netherlands: Elsevier Science BV, 253-270.

Håkansson, Håkan and Ivan Snehota (1989) “No Business is an Island: The Network Concept of Business Strategy”, Scandinavian Journal of Management, 5, 3, 187-200.

Håkansson, Håkan and Ivan Snehota (eds.) (1995) Developing Relationships in Business Networks. London: Routledge.

Laage-Hellman, Jens (1989), Technological Development in Industrial Networks, Ph.D. thesis, Uppsala University. Uppsala: Department of Business Studies.

Loasby, Brian J. (1999) Knowledge, Institutions and Evolution in Economics. London: Routledge.

Loasby, Brian J. (2000) “The Division and Organisation of Knowledge”, European Journal of Economic and Social Systems, 14, 2, 143-155.

Pedersen, Ann-Charlott (1996) Utvikling av Leverandørrelasjoner i Industrielle Nettverk, Doctoral thesis no. 107, Norwegian University of Science and Technology. Trondheim: Department of Industrial Economics and Technology.

Richardson, George B. (1997) (first printed 1960) Information and Investment – A Study in the Working of the Competitive Economy. Oxford: Clarendon Press.

Richardson, George B. (1972) “The Organisation of Industry”, The Economic Journal, September, 883-896.

Ritter, Thomas (1999) “Interconnected Relationships: The Effects of Relationships on Relationships”, Proceedings from the 15th IMP International Conference, Dublin, September, 1-16.

Yin, Robert K. (1989) Case Study Research – Design and Methods. London: Sage Publications.

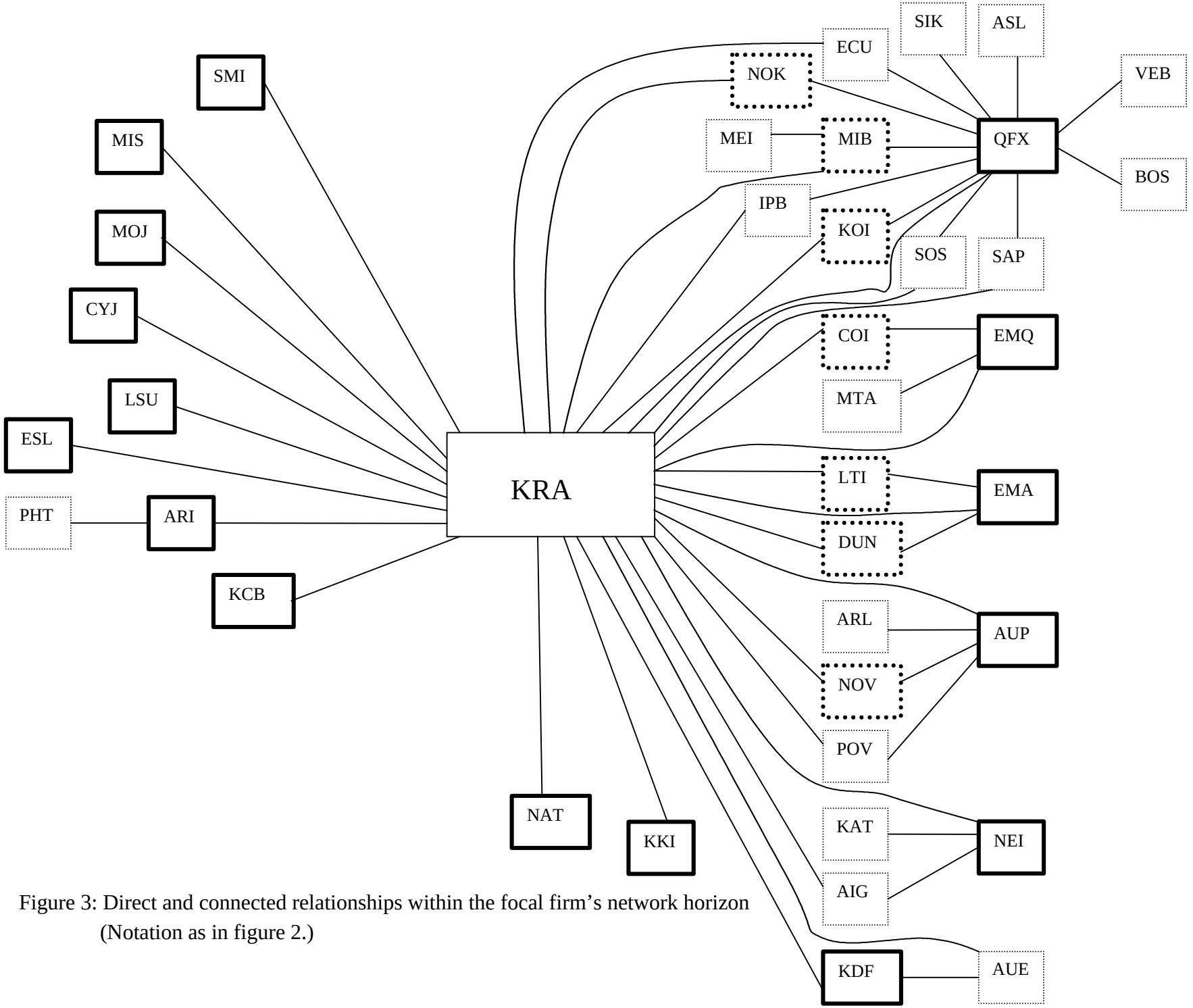

Figure 3: Direct and connected relationships within the focal firm's network horizon (Notation as in figure 2.)