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Innovation and inter-firm linkages: new implications for policy

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Abstract

This article discusses the implications for competition, innovation and learning of different forms of inter-firm linkage, ways to govern them, different 'generic systems' of innovation, and government policy. It employs a transformed theory of transactions that can deal with innovation and learning, and brings in trust next to opportunism [Nooteboom, B., 1996a. Trust, opportunism and governance: a process and control model. Organization Studies 17 (6) 985–1010; Nooteboom, B., 1996b. Towards a Learning Based Model of Transactions. In: Groenewegen, J. (Ed.), TCE and Beyond. Kluwer, Deventer, pp. 327–349; Nooteboom, B., 1999a. Inter-firm alliances: Analysis and design. Routledge, London.]. While trust has its limits and should not be blind, it can lower transaction costs. For learning and innovation, it takes the resource/competence perspective, supported by a theory of knowledge developed in earlier publications. According to this theory people perceive, interpret and evaluate the world according to cognitive categories that have developed in interaction with the physical and social environment. As a result people will perceive, understand and evaluate differently to the extent that they have developed in different environments without interaction [Nooteboom, B., 1992. Towards a dynamic theory of transactions. Journal of Evolutionary Economics 2, 281–299; Nooteboom, 1999a.]. This theory yields the notion of 'external economy of cognitive scope': people and firms need outside sources of cognition and competence to complement their own. That is the fundamental reason why inter-firm linkages are important, especially for innovation. In order to produce high added value and novelty, by utilizing the opportunities of complementary competencies, firms need to make relation-specific investments which creates risks of 'hold-up' and 'spill-over'. Building on earlier work, the article identifies different instruments for the control of those risks [Nooteboom, 1996a; Nooteboom, 1996b; Nooteboom, et al., 1997. Effects of trust and governance on relational risk. Academy of Management Journal 40 (2) 308–338; Nooteboom, 1999a.]. It identifies two 'generic' kinds of innovation systems, in terms of the mix of instruments for relational governance, and discusses their merits and flaws with respect to quality of products, diffusion, incremental and radical innovation. One is close to practices in continental Europe and Japan. Another is close to Anglo-American practice. There is a certain tendency for the first to gravitate to the second. The article warns about the dangers involved, and explores a possible 'third way'.

Keywords: Competition policy; Innovation policy; Innovation systems; Inter-firm linkages; Networks

1. Introduction

Is there a conflict between competition policy and innovation policy? Or does more competition also yield more innovation? There would be a conflict if it were true that large firms and concentrated markets on the one hand obstruct competition and on the other hand promote innovation. But there is no compelling evidence for either hypothesis. Competition can be fierce among only two firms, and even a

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single firm can be disciplined by the threat of new entry. Competition policy should therefore be oriented towards entry barriers rather than concentration. The Microsoft case is a good example: it is not criticized for its size or market share but from the suspicion that by bundling its Internet search software to its widely used windows operating software it is limiting competition and entry of new products. An old Schumpeterian issue is whether it is small firms (Schumpeter 'mark I') or large firms (Schumpeter 'mark II') that produce most innovation. There are theoretical arguments for both. When we look at the facts, it is clear that small firms participate less in R&D (Nooteboom, 1991; Vossen and Nooteboom, 1996), which would favour the 'mark II' hypothesis. But when small firms do participate, they tend to do so more intensively than large firms (Nooteboom and Vossen, 1995). Both results hold true for all 'Pavitt sectors' (Pavitt, 1984) except 'science-based' industries, where large and small firms seem to be equal in both participation and intensity. And there is evidence that small firms produce more innovation output per unit of input (for a recent empirical indication, see Brouwer, 1997). So, if anything, the evidence points to small firms being more innovative. The conclusion might be that policy should be oriented towards fighting entry barriers, and that this would promote both competition and innovation.

But the situation is not as simple as the analysis suggests. Should government actively promote inter-firm collaboration? It seems that vertical or lateral co-operation, between firms with different products, or with similar products in different markets, does not harm competition, and may have beneficial effects for innovation and the diffusion of innovations. And such co-operation entails complications,in the form of dynamic transaction costs, which may require some government facilitation. Horizontal co-operation, between firms with similar products in the same markets, raises suspicions of collusion, but here also the central issue is whether horizontal alliances limit entry of new firms, products or technologies. But vertical and lateral linkages between firms may also create entry barriers. There is a tendency to look only at the positive side of inter-firm networks, but they can create rigidities as well.

In this essay, I focus on vertical and lateral linkages between firms. Why, precisely, are they beneficial? Are they always beneficial? When are they, and when are they not? When they are, will they arise by themselves, or is government facilitation needed? What form should that take? If we can choose between different degrees of integration, such as mergers and acquisitions, equity joint ventures, non-equity alliances or yet looser forms of contracting, which is best? How deep and durable should linkages be? Along the way, implications for policy are specified in italics.

We should evaluate linkages between firms in comparison with all relevant alternatives. Not only the alternative of autonomous, unconnected firms, but also the alternative of integration by mergers and acquisition. Measures against inter-firm linkages may well result in further concentration and conglomeration, and from the perspective of both static and dynamic efficiency that may be worse than networks. This connects with an ongoing debate on the benefits of mergers and acquisitions. Policy tends to grant more room for them than for inter-firm linkages, but is that wise? Bleeke and Ernst (1991) showed that for firms with the same products in the same markets mergers and acquisitions yield the most success (from the perspective of the firms), and in other (vertical or lateral) linkages alliances do. Hagedoorn and Schakenraad (1994) found that 75% of unrelated mergers and acquisitions failed.

Thus, the policy question is not only whether inter-firm linkages should be stimulated, but also whether integration in the form of mergers and acquisitions should be limited.

Inter-firm linkages should be analyzed from a dynamic perspective of learning and innovation: that is obvious if the purpose is analysis for innovation policy, but apart from that we will not understand such linkages properly of we do not take their role in learning into account. To understand problems in inter-firm linkages, transaction cost theory yields a useful perspective, but it must be transformed to incorporate innovation and learning. This yields a different view of the function of the firm, and at least one prediction which is opposite to predictions from classical transaction cost economics (as developed by Oliver Williamson). From static transaction costs, we must move on to dynamic transaction costs in the

transfer and joint production of knowledge (Teece, 1986). Among other things, these include risks of spill-over to competitors through partners. 'Spill-over' here refers to all possible ways in which a competitor may gain access to competencies that form one's competitive advantage: espionage, imitation, poaching of employees, reverse engineering.

I further propose that for a proper understanding of competition and co-operation we should take the 'resource' or 'competence' view of the firm (which goes back to the work of Penrose, 1959, cf. Foss and Knudsen, 1996): competencies are to a greater or lesser extent firm-specific and cumulative. They partly take the form of tacit knowledge, and are embedded in heads, hands, teams, organizational structure, procedures and culture. They determine to what extent firms can absorb novel technology (Cohen and Levinthal, 1990). Their embedding in the firm, plus limited absorptive capacity of potential competitors constrains (but does not eliminate) risks of spill-over to the competition (Lippman and Rumelt, 1982). This view abolishes the notion of the 'representative firm'.

From a policy perspective, the most important implication concerns the notion of competition: firms compete not by striving to do the same thing most efficiently, but by trying to be different; to offer differentiated products on the basis of firm-specific competencies.

Whereas former notions of markets, and the notion of firms as production functions saw market opportunity driving the utilisation of resources, here it is rather the other way around: resources determine market opportunities.

2. Learning, variety and linkage

The competence view of the firm calls forth the need for an explicit theory of knowledge and learning. The implicit theory of mainstream economics is 'naive realism': it may take time and money for people or firms to acquire 'information', but when it is acquired, it is the same for all. By contrast, I employ a 'constructivist' theory: people (and firms) perceive, interpret and evaluate the world according to categories (or 'mental maps' or 'frameworks') that they have developed in the past, in interaction with their physical and social environment. As a result, cognition is cumulative, and to a greater or lesser extent idiosyncratic and path-dependent (Nooteboom, 1992): past experience determines 'absorptive capacity' (Cohen and Levinthal, 1990). People and firms have different knowledge to the extent that they have different experiences and little interaction.

As a result, the primary function of the firm may be cognitive, as a 'focusing device' (Nooteboom, 1996b): in order to achieve anything at all, a firm must direct and align perception, understanding and evaluation by the people connected with it. The need for such focusing is greater to the extent that the environment is more complex and variable, and to the extent that firms must strive to differentiate their products. For reasons that it would go too far to discuss in the present essay, there is such a tendency towards 'radical product differentiation' (Nooteboom, 1999a). The analysis connects with the Schumpeterian idea of the entrepreneur as a charismatic figure who not only combines resources but aligns people in their cognition and purpose (cf. Witt, 1998). But this solution to the problem of cognition and action raises another problem: by focusing in one direction one runs the risk of missing out on perception of opportunities and threats from other directions. To cover for this, one needs complementary, outside sources of cognition: cognition by others which is relevant but also different. I called this the principle of 'external economy of cognitive scope' (Nooteboom, 1992). Such outside sources of complementary cognition require a 'cognitive distance' which is sufficiently small to allow for understanding but sufficiently large to yield non-redundant, novel knowledge. For the external source to maintain novelty it is crucial to maintain distance. Acquisition or merger may eliminate distance and thereby novelty.

This analysis yields a new reason for external partners, in linkages between firms, which goes beyond static considerations of specialisation, scale and the 'powerful incentives' of markets, such as employed in transaction cost economics. Whereas transaction cost economics predicts more integration of activities within larger firms under greater uncertainty, this analysis suggests the opposite: when

complexity and variability of technologies and markets increase the need for external partners for complementary cognition increases. [1]

The analysis links up with the notion from evolutionary economics that innovation requires a source of variety to generate novel experiments that are subjected to the selection mechanism of markets (Nelson and Winter, 1982). When cognition is firm-specific, novelty requires a collection of different firms with different perceptions based on different experiences.

3. Integration and disintegration

The analysis suggests that there are reasons to favour relatively disintegrated structures, such as 'industrial districts' of mostly smaller firms, over integrated, large firms: to maintain variety and cognitive distance.

However, we should be careful here: the real issue is not small versus large firms, but degrees of integration. Industrial districts can be tightly linked, and in large 'virtual' firms units can be highly autonomous in decision rights, including the right of outside sourcing. Famous examples of the latter are Benetton and 3M. Increasingly, large consultancy firms are operating on the basis of 'communities of practice' (Brown and Duguid, 1991) of fairly autonomous consultants, who utilise and feed a shared pool of knowledge, with cross-fertilisation between communities by rotation of personnel. Perhaps this can offer requisite variety and flexibility in a large firm.

Furthermore, disintegration is a virtue only in some stages of innovation: the stage of radical novel combinations and their experimentation in trial and error. Here existing linkages, within and between firms, can provide obstacles. In other stages in the process integration, within a firm or in enduring inter-firm linkages, gives advantages of efficient, speedy diffusion, systematisation, scale, cumulative efficiency, incremental innovation and extension across novel markets. This, and especially the extension and adaptation of products across (global) markets, is part of the overall process of discovery because it generates insight in limitations and opportunities for better alternatives, which provides both the material and the incentive for a next round of novel combinations (Nooteboom, 1999e).

In other words, from a dynamic perspective more and less integrated structures, with stronger or weaker linkages between activities, are complements rather than substitutes: they have comparative advantages in different stages of the innovation process. This is the principle of 'dynamic complementarity' (first suggested by Rothwell, 1985).

This raises complications for policy: if at one stage one should encourage weak linkages or the break-up of existing linkages, and in another strong and to some extent enduring linkages, the following questions arise. How do we decide in what stage we are? Will the effect of policy come in time, before the next stage is already begun? How do we deal with the possibility that in one industry, or part of an industry (or even part of a firm), we are in one stage and in another in a different stage? How do we square this with our preference for generic policy which is not specific to industries, let alone different parts within an industry?

The analysis connects with comparisons between countries, such as the comparison between Germany and the US (Gelauff and den Broeder, 1996). As will be discussed and analyzed later, Germany is oriented towards more or less enduring network relations, which favour diffusion and incremental innovation, specific investments for quality and differentiated products which yield opportunities for a variety of (incremental) innovations. The US is oriented towards activities integrated in autonomous firms which have short-term, arms-length relations among each other, which favours low cost production of standardized goods and radical innovation. Radical innovation is facilitated by the flexibility following from a lack of enduring relations between and within firms. However, though more radical innovation is less varied and less frequent due to lesser product differentiation.

[1] But this does not invalidate transaction cost analysis. It is still true that in inter-firm relations there is a problem of governance when uncertainty precludes complete contingent contracts.

The point is that one cannot say that one system is better than the other under all conditions (Nooteboom, 1998a). The one is better at some and the other at different stages of the innovation process. Such comparative advantages are closely connected with the institutional environment of nations, which may favour linkages between firms or rivalry between them.

An option for policy which is generic rather than specific to industries is to influence the underlying institutions (North, 1990), with due recognition of the fact that typically institutions change only very slowly. But this gives all the more reason for looking into it. Without such analysis we may find in 10 years from now that we have let useful institutions erode, and cannot redress the situation quickly.

4. Governance of linkages

In order to proceed, and to assess the impact of institutions, we must analyze more closely the types of linkage and their advantages and costs of 'governance'. That analysis cannot be provided here, and I can only give the conclusions (cf. Nooteboom, 1999a).

If technology is inflexible, then specific (i.e., differentiated) products entail specific investments. As taught by transaction cost economics this yields transaction costs; particularly the fact that specific investments create switching costs, which lead to 'lock-in', which makes one vulnerable to opportunistic 'hold-up'. Note that product differentiation is closely related to product quality: the most current definition of quality is 'conformance to specific needs'. In other words: when technology is inflexible, quality entails transaction costs. Note that when technology is flexible, as in some areas it increasingly is, due especially to the use of information- and communication technology, one can produce differentiated, high quality products with limited problems of specific investments (Nooteboom, 1993).

I also note that transaction cost economics does not suffice to explain activities and boundaries of firms. What activities a firm engages in and how it distributes activities between itself and outside partners depends on considerations concerning the creation and protection of competence (Kay, 1998). Protection entails a policy to control spill-overs to competitors (Teece, 1986). I noted that due to the embodiment of knowledge in tacit knowledge, skills, structure and culture spill-over is constrained but not necessarily eliminated. From the resource perspective, I indicated before the notion of the firm as a 'focusing device'.

But the fact that transaction cost economics is incomplete should not move us to discard what is useful in it. As analysed in transaction cost economics, the problem of transaction costs due to specific investments can be solved in three ways.

(1) By evasion of hold-up risk: integrating activities in a firm ('hierarchy'), evading specific investments and limiting inter-firm contracting to activities that are susceptible to legal contracting.

(2) By control of hold-up risk: using various instruments of 'governance' of inter-firm relations. These are: long term contracts, sharing ownership of dedicated assets, mutual dependence by mutual investment in dedicated value, yielding or taking monopoly or monopsony in exclusive relations, posting hostages, employing reputation mechanisms. Which 'relational mix' of instruments should be designed depends on the context.

(3) While Williamson (1993) rejects the notion of trust as a basis for governance, I accept it, and to the instruments of governance I add: building trust on the basis of shared norms, habituation or personal bonding (Berger et al., 1995; Nooteboom, 1996a,b; Nooteboom et al., 1997). However, note that while trust may reduce transaction costs, it may also create rigidities of loyalty and reciprocity (Nooteboom, 1999c).

Trust is too complex a notion to discuss here in any detail (see Nooteboom, 1999a,c). However, I should say here that I reject the claim of Williamson (1993) that trust does not and should not go beyond calculative self interest. Williamson argued that if it did it would be blind, and blind trust does not survive. But I argue that it can go beyond calculative self-interest without being blind. It goes beyond self-interest, on the basis of ethical norms of conduct. It goes beyond calculativeness in social 'programming' of values and routinization of co-operative conduct. How far this goes varies between cultures. It is not thereby blind, for two reasons. First, routinization is based on proven past perfor-

mance and reliability of a co-operative relation, and thus has a rational basis even though it is no longer based on conscious deliberation. Second, trust is indeed not unlimited: it applies only up to some 'golden opportunity' of opportunism which goes beyond a partner's ability to resist temptation, or up to a crisis which may force a partner to defect in order to survive. In contrast with a bodily reflex, a routine can be 'called awake' by exceptional conditions, to revert to calculativeness. This does not invalidate trust: its operation within such boundaries significantly helps to keep transaction costs low, as many authors have claimed. Where the boundaries lie depends on the cultural context and experience between parties in a specific relation. Trust is slowly built up and can easily be destroyed. This increases the care with which parties treat each other as trust builds up, because the cost of triggering mistrust increases.

5. Generic systems of governance

In the stereotype of Germany vs. the US, the US takes the first and Germany the second option for governance, indicated above. In Table 1, I abstract from the specific US–Germany comparison, to arrive at two 'generic systems' A and B.

In system A, the focus of buyers in their relations with suppliers is on low cost, achieved by bargaining under the threat of alternative partners, which in order to be credible requires abstention from switching costs due to specific investments. What risks of opportunism are left are covered by legal contracting. The mode of conduct is 'exit' as opposed to 'voice' (Hirschman, 1970; Helper, 1990). When dissatisfied, rather than deliberating ('voice') one exits from the relation: switches partners, calls in a loan, sells shares or part of a company, fires people, etc. Absence of specific investments leads to absence of switching costs, which enables exit, but also leads to low quality in the sense of undifferentiated, standard products, to the extent that technology is inflexible. Lack of product differentiation entails a lower frequency and diversity of product innovation. Legal contracting is intended to leave little 'room for opportunism' (Nooteboom, 1996a,b). There is high 'inclination towards opportunism', confirmed by mutual suspicion expressed in legal contracting and non-exclusive non-dedicated relations, and in the 'exit'

Table 1
Two generic systems

	System A formal, multiple	System B informal, exclusive
Characteristic	formal contracts multiple relations	implicit contracts lasting, more ex-clusive relations
Mode of conduct	'exit'	'voice'
Culture/institutions	individualistic large firms legalistic	groups networks of firms group ethic
Mediating variables		
Specific investments	low	high
Switching costs	low	high
Value of the partner	low	high
Room for opportunism	low	high
Inclination to opportunism	high	low
Performance outcomes		
Production costs	low	higher
Transaction costs	higher	lower
Product differentiation	low	high
Incremental innovation	low	high
Creative destruction	high	low

Source: Nooteboom (1999d).

mode of conduct. When we turn to the performance of this system we find: low costs due to competitive bidding for standard components and products, low quality in the sense of undifferentiated products (if technology is inflexible), high transaction costs due to low trust and extensive legal contracting. Detailed contingent contracts are less feasible in turbulent environments of radical innovation, and if feasible would yield a straightjacket that frustrates the open-endedness required for collaboration in innovation. Low trust not only increases transaction costs, but also inhibits the information exchange required for such collaboration (out of fear for spill-over). This limits collaboration to partners within the own firm, which yields the need to integrate contributing activities in the firm. But as I argued above, this reduces 'cognitive distance' and thereby the variety and flexibility of sources of complementary competence and cognition. The merits and limitations of system B are generally opposite to those of system A, and their systematic analysis is left to the reader. Its mode of conduct is 'voice': when dissatisfied, one announces this and tries to repair the relation by deliberation and renegotiation. Note, however, that there will seldom be a complete absence of contracts, even in system B, but there they serve the purpose of a record of what was agreed, to prevent misunderstanding, to support co-ordination and enable division of labour. Evidence of this is given in the doctoral dissertation research of Klein Woolthuis (1999). Contracts also constitute what one might call a ritual of agreement.

Next to its advantages system B has its disadvantages. Exclusiveness or small numbers of relations per activity has its function in reducing set-up costs of relations, reducing risks of hold-up due to specific investments. It thereby encourages such investments, and limits risks of spill-over. And note that there is more variety as a source of innovation in linkages between than inside firms. But this variety may also be limited due to the exclusiveness of relations, which limits new entry into the network, and variety within the network may erode (and cognitive distance may become too small) when the linkages last too long.

A crucial issue now is this. It is suggested that due to the absence of durable network relations between firms, system A (the US) has more flexibility of configuration, deemed necessary for the Schumpeterian 'novel combinations' of radical innovation (Gelauff and den Broeder, 1996). But note that in system A linkages that require specific investments are internalized, and what linkages are more flexible: between firms (system B) or within firms (system A)? System A can achieve the flexibility needed for radical innovation only if firm organization is flexible: firms can easily be broken up, labour relations are short term and susceptible to high turnover.

A policy implication is that before we gravitate further towards the Anglo-American system, we should be aware that we cannot assume that we can adopt one part of the system (e.g., shareholder value in corporate governance) without the other (easy break-up of firms and short-term labour relations).

Note also that the weight of my earlier criticism of mergers and acquisitions increases when the resulting integrated firms can not easily be broken up. Apart from the trade-off between on the one hand high quality plus efficient diffusion and incremental innovation (system B) and radical innovation (system A) we should be aware that easy break-up of firms needed for radical innovation in system A may have detrimental effects on the commitment of labour to firm-specific training and teamwork which may also be needed for radical innovation. The net effect on radical innovation is not obvious.

6. A third way?

Because clearly we cannot freely choose or engineer the cultural conditions of trust, we need to devise solutions that are consistent with the institutional environment that is given. But institutions that support trust can erode, and then become very difficult to institute. Within such constraints, rather than trying to be like either of the two generic systems A or B, perhaps we should search for a third way that is efficient in both the static and the dynamic sense, fits the national institutional set-up, and is systemically coherent and consistent. Could we achieve the advantages of both systems without the disadvantages? One way to look at this is to ask whether in system B we can make more room for less exclusive,

multiple relations and sufficient flexibility of relations, while maintaining the depth and sufficient duration of relations. The latter are preserved to enable and protect specific investments for differentiated products, intensive co-operation and exchange of knowledge, with limited, implicit contracts and the building of trust.

But first there is a nuance to be considered. It was noted before that to the extent that technology is flexible, one can make differentiated products without specific investments. Further flexibilization of production, by means of information and communication technology is quite possible. In particular, flexible manufacturing systems, including computer-aided design and computer simulation for virtual instead of physical testing of prototypes. That is to the advantage of system A, and consequently this development is likely to yield a shift to system A, in the industries in which this development occurs, unless the 'third way' offers a more attractive option.

Note also that the problem of spill-over disappears in a world of radical speed of change in complex technologies and markets (Nooteboom, 1998a). If knowledge or competence is obsolete by the time that it reaches a competitor and can be embodied in products and brought to market by him, then the problem of spill-over drops out. Then there no longer is any limit to the number of partners in co-operation. That offers more *possibilities* for multiple relations. And in such a world there is also a greater *need* of multiple relations: competition more and more becomes a race to the market with new products. To have any chance at winning the race one must limit oneself to core competencies, which implies co-operation with others. In that situation one needs more variety of sources for co-operation, rather than a few exclusive ones.

The 'third way' exists mainly in that from the relational system B we adopt in-depth co-operation, with specific investments, differentiated products and intensive exchange of knowledge, but in combination with the greater flexibility and multiplicity of relations from the other system A. In short, whereas system A was characterised by 'formal and multiple' relations, and system B by 'informal and exclusive', the third way would be characterised by 'informal and multiple' relations. The goal then is as indicated in Table 2.

Table 2
Third way

	System C informal, multiple
Characteristic	implicit contracts open, multiple relations
Mode of conduct	'voice'
Culture/institutions	networks group ethic the 'go-between'
Intervening variables	
Specific investments	high
Switching costs	middle
Value partner	high
Room for opportunism	high
Inclination to opportunism	low
Outcomes	
Production costs	low
Transaction costs	low
Product differentiation	high
Incremental innovation	high
Creative destruction	high

Source: Nooteboom (1999d).

How is that goal realized? There is a problem of multiplication of set-up costs of relations and of the costs of specific investments, as a result of the multiplicity of relations. The first problem may be mitigated by declining costs of contact between firms, due to the further development of information and communication technology, which may be expected to decrease the costs of setting up and entertaining a network linkage. The second problem becomes less if flexible technology also is a salient part of the new world, because as discussed products can then be differentiated without specific assets.

Suppose, however, that technology is not that flexible. In principle, in view of specific investments a relation need not last longer than needed to recoup those investments. As the theory of repeated games tells us, a danger may arise when one establishes beforehand when a relation is to be ended. It is precisely in the uncertainty about the end, and the possibility of an ongoing relation, that it may be in one's self-interest to refrain from opportunism. Yet these two principles can be reconciled. One can make firm agreements for a duration that does not exceed the time needed to recoup the investment,

and yet keep the option open for renewed continuation if the relation fits the new conditions and yields attractive prospects. That gives more flexibility than now, in system B, for the re-configuration of relations when the gales of creative destruction gather. This is indicated in Table 2 by taking switching costs as of 'middle' height.

There still is the issue of the sources of trust. To the extent that initial trust is already in place, on the basis of more or less well developed and shared norms of conduct, as part of what North called the 'institutional environment' there is no problem, except perhaps that it must then be protected against the invasion of opportunists. [2] If trust is to be built up in each relation, in specific 'institutional arrangements' (North and Thomas, 1973), then the time needed to do that, and to recoup the specific investment that it constitutes, can pose a problem. The minimal duration of a relation then is determined by the longest of the following two: the time needed for recouping specific investments and the time needed for the building of trust and recouping the investment that it represents. If the latter is decisive, then a possible solution is that the source of trust is not sought within a given relation, but in a larger group of potential partners that can enter upon varying relations among each other. And that, it seems, is exactly the function of the Japanese enterprise groups (keiretsu). The advantage of such groups is that on the one hand there are trust and durable relations within the group, and on the other hand competition between the groups is maintained (or so I assume). This by itself does not imply that the Japanese system is ideal. The possibly excessive duration of relations and the relative exclusiveness of especially vertical buyer–supplier relations yield an obstacle to innovation, since they curtail the variety of contacts that is a source of innovation (Nooteboom, 1998a).

Along these lines, policy should seek to establish a reconciliation between co-operation (durable linkages) and competition in the sense of multiplicity of relations, and of a greater ease of entry and exit in networks, due to relations being sufficiently durable but no more than needed to recover the specific investments needed for high quality of products and collaboration in innovation.

7. The go-between

A possible element of the 'third way' might be the use of a third party as a 'go-between', to mediate between would-be partners, as an 'engine of voice' (Nooteboom, 1999b). Already in classical transaction cost economics Williamson indicated the possibility of engaging a third party as a go-between ('trilateral governance', Williamson, 1985). That was inspired by considerations of efficiency. When governance to control transaction costs is needed but the transactions involved are too small or infrequent to justify the often considerable costs of a 'bilateral' governance scheme, then it can be more efficient to make a simpler overall agreement and engage a third party for arbitration. That party must have the trust of both protagonists, in both his competence and his intention to judge effectively and fairly.

But there are more roles for the go-between. A second role is to act as a guardian of hostages. Without that, there may be a danger that the hostage keeper does not return the hostage even if the partner sticks to the agreement. This danger can be reduced by stationing the hostage at a third party, who can be trusted not to hesitate to sacrifice the hostage if the giver does not stick to the agreement, but also has no interest in keeping the hostage longer than agreed. This solution is antique, and was practised in the middle ages, in the exchange of hostages between kings (de Laat, 1996).

A third role for the go-between is to act as a filter against spill-over. This is important if change is not so fast as to render information useless by the time it is imitated. Especially at the beginning of a relation between parties that do not know each other there is

[2] Hill (1990) argued that if it is true that trust reduces transaction costs, this should give a competitive advantage in global competition, by which in the long run of global competition the more trusting societies will pervail. But the maintenance of an ethic of trust may require barriers to entry of opportunists, because such entry may unravel the infrastructure of trust. But such closure of domestic markets may invite retaliatory exclusion from global markets, and this penalty may exceed the benefit of the differential advantage of a trust society. Along this line of argument trust might disappear rather than prevail (Nooteboom, 1998b).

problem that one does not want to make specific investments before one has sufficient trust in competence and intentions of the partner. But in the giving of information there is the paradox of Arrow, yielding the 'revelation problem': to judge the value of information one must already have it, but then there is nothing left to bargain about, and the damage of spill-over may have already occurred. The third party, who has the trust of both protagonists, already knows both sides well enough to reliably inform them on the competence and intentions of each other, without surrendering much information on content.

A fourth role, connected to the third, is to act as an intermediary in the building of trust. Trust relations are often entered with parties who are trusted partners of someone you trust, and the latter then acts as an intermediary. Intermediation in the first small and ginger steps of co-operation, to ensure that they are successful, can be very important in the building of a trust relation. Things may go wrong in a relation either because of mistakes or because of opportunism, but in practice they are difficult to distinguish because an opportunist will claim mistakes or mishaps as the cause of disappointing results. The intermediary may solve misunderstandings that turn mistakes into perceived indications of opportunism. A problem in collaboration, especially in innovation, is that under some conditions there may be opportunities and incentives for free ridership, or for one party extracting more gain than others, or even expropriating their gain. A go-between can act as a guardian against that.

A fifth role is to act as a boundary spanner between the network and potential outside sources of innovation, to protect against the closure of a network, and thereby reduce the risk of rigidity discussed above as a drawback of system B. It may be threatening to partners who are active participants in the network for any of them to maintain outside contacts, for fear of spill-over. This is one reason for instituting a formal, equity joint venture: to build walls around the venture. The alternative, which is less costly and cumbersome, is a go-between, who has no direct stake in the network, and therefore has more leeway for outside contacts of reconnaissance without constituting a threat.

Finally, a sixth role is to help in the timely and least destructive disentanglement of relations. That is desirable to enhance flexibility of novel combinations for radical innovation, as indicated above. Such disentanglement is problematic when one side (say X) wishes to get out but the other side (Y) is too dependent to get out without serious problems. X is then tempted to conceal his intentions of defection to avoid trouble, and spring the surprise at the last moment. But this makes the break even worse for Y, who may then try to lock X in by litigation, threats to sacrifice hostages or defame reputation. This may then tempt X to take retaliatory destructive action to force his way out. To avoid such conflict in separation it is better to aim at a co-operative break-up, with an early warning and timely search for the best alternative for Y. However, as noted before, an announcement of the end of the relation can lead to a premature unravelling. The go-between can help to prevent this, and maintain as productive a relation as possible, while not engaging in further specific investments, which would increase switching costs, and easing the relation towards a peaceful end. The go-between can mediate in damage control such as a severance pay for specific assets still outstanding, a peaceful return of hostages and prevention of reputation destroying slander. In this way Y may be coached not to resist the break-up but co-operate, in order to get out with the least possible damage. In such a situation it would be difficult for Y to trust X in providing such help. The go-between could thus be a broker not only in marriage but also in divorce.

The third and fourth roles are especially important in innovation, because there exchange of knowledge or information is crucial, with corresponding risks of spill-over, and specific investments need to be made to set up mutual understanding and co-operation, with corresponding risks of hold-up, while especially in innovation the competencies and intentions of strangers are difficult to judge.

Note that in all roles it is crucial that the go-between is impartial and incorruptible and has an interest to act scrupulously, with a view to his reputation as a go-between. There is a connection between the 'third way' and the go-between. Perhaps we can create more flexibility of co-operative relations, while maintaining their quality and depth, by employing relation brokers who play the roles indicated. That is why in Table 2 the go-between is included under the category of 'institutions'. One can suspect that this

may be related to the central role of banks and trade companies in the Japanese enterprise systems, the role of technological institutes and banks in the German system, and perhaps the role of members of supervisory boards (Nooteboom, 1999d).

Evidence of some of these roles emerges from a longitudinal study by Klein Woolthuis (1997) of co-operation between 11 firms in the development of medical products, and the roles of two intermediaries: an innovation transfer centre and a regional development centre. This showed that roles of the intermediary can be divided between several go-betweens, in this case two. Further casual evidence emerges from workshops I conducted with advisors from the government sponsored 'Innovation centres' in the Netherlands, whose task it is to intermediate in technology transfer to small firms. In both cases the roles that could be clearly recognized were the first role of intermediation instead of contracts, the second role of trust building and the third role of solving the revelation problem. The advisors had stumbled across these roles, developing them in trial and error, and were surprised that one could analyze them systematically. There was also some evidence of the role of boundary spanning with other networks. The fourth role of hostage keeping and the sixth role of disentanglement were less clear. However, the advisors recognized that perhaps some of the things they do could perhaps be interpreted as hostage keeping. They also indicated that although they had not performed the sixth role they had come across the problem, and that it might be worthwhile to contemplate it as a possible task in their further practice. For a more detailed discussion of the evidence, see Nooteboom (1999a) (pp. 145–146). The evidence is casual, however, and there is a need for more systematic testing.

In several countries, there is a policy debate on the role of central or regional government in the formation of enterprise 'clusters'. Should government take the roles of the go-between? They are not easy. They require expertise in the areas of technology involved, sharp insight in the factors that play a role in co-operation, and the skill to handle them. One needs to know potential partners well without extending favours at the expense of others. Reputation in competence and intentions is crucial, takes time to build and is easily destroyed. In view of this, it seems doubtful that this is a role for government; certainly not for central government. That may be strong on intentional trust (fair dealing) but not on competence trust. The skill involved is too specialized. Furthermore, the risk of loss of prestige is too great, such loss of prestige could easily arise locally, infect the entire agency that provides the service, and from there on government more widely. And there may be too much temptation to corruption.

So, I would recommend that the government limit itself to the (legal) enabling and facilitation of this role, to be played by others, and then focus on the monitoring and control of possible misuses in the form of exclusion of outsiders or corruption.

8. Conclusion

We should beware not to gravitate too much to 'Anglo-American' styles of 'governance' of firms and their linkages. It would fit several European countries, such as the Nordic countries, the Netherlands, Belgium, Germany, with their more or less well developed institutions of consensualism and informal (non-legal), trust- and 'voice'-based dealings, to seek a 'third way' in the governance of inter-firm relations. This would be characterized by multiple, non-exclusive relations between firms that are sufficiently durable to recoup the specific investments needed for quality products and collaboration in innovation, but not more durable than needed for that. This might constitute a viable and fitting reconciliation between competition and collaboration. It is viable with respect to problems of spill-over (from the perspective of the firm) if we focus on activities in which the knowledge involved is highly tacit, or on products and technologies which change fast relative to the time needed for spill-over to take place. It is viable with respect to governance if we utilize and maintain an ethic of decency, trust and co-operation, to the extent that it exists, combined with entrepreneurial drive and initiative, and foster the roles of appropriate go-betweens. An option within this scenario also is to enhance flexible technology, to reduce the need for specific investments.

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