

**Clustering and the Creation of an Innovation-Oriented
Environment for Industrial Competitiveness: Experiences from a
Comparative Perspective**

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1 Introduction

In the course of the 1990s, *clusters* became a target for local and regional initiatives to promote competitiveness and job-creation. What played an important role in putting clusters onto the policy agenda was a 1990 book by management guru Michael Porter, *The Competitive Advantage of Nations*, which in fact was much more about subnational regions than nations. Porter's argument underlined what other authors had argued before, namely that firms which are operating with close proximity to a set of related firms and supporting institutions are often more competitive than firms which operate in an isolated manner (Piore and Sabel 1984, Schmitz 1989). This is due to both competition and co-operation. Competition at the local level is usually much less abstract, and often involves personified rivalries, thus creating a stronger pressure than the anonymous mechanism of the invisible hand. Co-operation does not necessarily mean formal alliances, even though even competitors have shown an increasing tendency to enter into arrangements such as strategic technology alliances. Co-operation at the local level often involves activities like informal communication between firms along the value chain, or information about innovation being exchanged over a beer or through employees which move from one firm to another.

Such constellations had in particular been observed in Italy, where clusters, often mainly consisting of small and medium-sized firms, had proved much more dynamic than large-scale, private or government-run industries, often establishing a strong presence on world markets (Becattini 1990). Italy's industrial districts became something of a mythical reference point of the discussion (which in fact was a distorted discussion in several respects)¹. Another important reference point was, of course, Silicon Valley, which was also described as a cluster, or rather an agglomeration consisting of several interrelated clusters (Storper and Harrison 1991). Such phenomena have been conceptualized under different headings: regional systems of innovation (Cooke 1992, 1994), innovative milieus (Camagni 1996), the region as a nexus of untraded interdependencies (Storper 1995). Each of these approaches put a emphasis on certain aspects, but with respect the policy recommendations the differences were negligible. The impressive dynamism of such places motivated actors in other, less dynamic regions to formulate cluster initiatives in order to stimulate growth and job-creation.

In the past years I had the opportunity to observe a number of cluster initiatives both in industrialized countries (Germany, Spain) and in newly industrializing countries (mainly Brazil). One common observation emerged: It is quite complicated to formulate and successfully implement cluster-based initiatives for competitiveness in places where there is little tradition of co-operation. There are many places which match with the cluster definition

1 Italian industrial districts are not a static constellation but rather undergoing a dramatic evolution. In the 1990s, it has been found that inside many of them concentration processes occurred, and that some others began to de-verticalize, i.e. to relocate certain activities to other locations; see Brusco et al. 1996, 28 f., Ottati 1996, 45 ff., Crestanello 1996, 72 ff., and Belussi 1999.

of the academic literature, but many (if not most) of them do not display the co-operative mindedness described in the early literature on Italy.

This leads us to a key term from the title of this paper, namely *innovation*. There are, in fact, two meanings of this term when speaking about a cluster. First, quite obviously, there is process- and product-innovation inside firms, i.e. innovation as the source of competitiveness of firms. In this respect, clusters have often shown to be innovation-stimulating environments. Localized rivalry is one important driving factor, but other factors – informal communication between firms, competent training institutes, technology extension – also play an important role. This is what the literature about innovation in clusters mostly is about (see, for instance, the collection in OECD 1999).

Second, and somewhat less obviously, there is innovation regarding the way the cluster as a whole operates. This applies to the cluster's paradigm, i.e. the way the actors in the cluster define key issues. This is less about technical and more about social innovation. One such issue is the local technological paradigm, i.e. the consensus on what does or does not establish sensible or viable technological approaches to solve certain problems. Another issue is the local industrial organization paradigm, i.e. the prevailing thinking about the most adequate way of solving the make-or-buy decision, or to put it differently, the issue of vertical integration within firms and vertical and horizontal division of labor between firms. Still another issue is the way the actors in the cluster define themselves, and the characteristics of relations between themselves. With respect to any of these issues the innovative capacity of the cluster is important for its evolution and essential for its survival.

Regarding the last issue, i.e. the characteristics of relationships between actors, it often occurs that co-operation inside a cluster – between firms, between firms and institutions, and between the private and the public sector – is weak, in particular when it comes to activities that go beyond common business transactions, in particular collective action to enhance the competitiveness of the cluster as a whole. In a survey of 160 clusters, Michael Enright (2000, 14 ff) found that on a scale from 0 to 5, the importance of organizations in clusters ranges mostly between 1 (very unimportant) and 2 (unimportant) (Figure 2). In a cluster with little tradition in collective action and not very important organizations, local actors will perceive concepts such as "collective efficiency" (Schmitz 1995), i.e. competitiveness based on intense networking between firms, as a strange suggestion since it does not at all meet with their experience of local rivalry. In such places, which are, in fact, rather frequent, cluster initiatives face two quite different challenges in terms of innovation. Before the challenge of how to improve the competitiveness and innovativeness of firms can be addressed, local actors must face the challenge of how to overcome a non-cooperative culture.

In this paper I will not take a limited, technocratic view at innovation in clusters and possible means to promote it. In my view, it is a shortcoming of the current discussion on clusters, innovation, and competitiveness that it tends to have a technocratic view, underestimating the obstacles to successful collective efforts in non-cooperative clusters. I will address the issue within a wider perspective, looking to some extent at technical innovation but in particular at

social innovation. With respect to the latter, I will introduce a structured view at obstacles for co-operation in clusters, and how to overcome them. In the following section I will briefly introduce main possible areas of co-operation. In the subsequent section, I will outline the main obstacles for co-operation. In the final section, I will present some experience how non-cooperative cultures in clusters were overcome and what general conclusions one can draw from this.

2 Possible areas of co-operation

Based on the case-studies from successful clusters we can identify three main areas of co-operation:

- bilaterally and multilaterally between firms,
- between firms and supporting institutions,
- between the private sector and the public sector.

2.1 Co-operation between and among firms

Co-operation between firms typically involves three features which can be analytically distinguished, namely relational contracting, information exchange / joint learning, and collective action.

Relational contracting is the opposite of arms-length relationships (Dore 1992). Whereas the latter typically involve spot transactions, often based on auctions or auction-like arrangements, relational contracting involves a long-term business relationship. Arms-length relationships require extensive legal dealings, whereas relational contracting is often based on trust. Relational contracting occurs both within hierarchical settings (for instance in supplier relationships in Japanese industry) and in heterarchical environments (e.g. industrial districts).

Typical kinds of information exchange between firms include the following:

- Informal information exchange between firms in supplier/subcontracting arrangements, going beyond what is necessary for arms-length transactions. The customer may give assistance to his suppliers, e.g. how to work with certain new materials or how to deal with quality problems. This may happen both among neighbouring firms and within global supplier networks.
- Formal and informal information exchange between firms in strategic alliances. There has been a strong increase in the number of national and international strategic alliances between firms, i.e. co-operation ventures aiming at the development of a given technology

on the basis of a contract. Behind this is the necessity to pool R&D resources to reduce development lead-times and to realise synergies.

- Formal and informal information exchange between firms in business associations. They often are a forum for technical discussions.
- Information exchange between firms' employees in professional associations, which may be formal (e.g. presentations in conferences) or informal (e.g. discussions during meetings and conferences).

Frequent types of collective action include the following:

- the provision of real services by business associations.
- jointly maintained, organisationally separate mesoinstitutions in fields like training, technology information, or export information.
- political lobbying and active participation in forums which work on shaping locational advantages.

In the real world, relational contracting, information exchange, and collective action will often go hand-in-hand; in fact, all three types of activities will reinforce each other, i.e. meetings in well-functioning business associations open opportunities to informal information exchange, and information exchange may reach barriers that can only be overcome through collective action. Taken together, this leads to the emergence of inter-firm networks.

In the view of institutional economics there are two major reasons why firms co-operate, namely transaction costs and principal-agent problems in arms-length relationships (Richter and Furubotn 1996). Arms-length relationships require an elaborate contract which is costly to set up, negotiate, and enforce, thus causing high transaction costs. Principal-agent problems emerge to the extent that, for instance, a subcontractor or supplier is contractually obliged to employ certain process technologies but chooses a cheaper alternative, and the principal contractor is not easily able to tell the difference (for instance in surface treatment or chemical treatment of textiles). Some co-operation arrangements (e.g. strategic alliances) may also involve principal-agent-problems. Relational contracting and dense, long-term networks may offer substantial benefits in terms of minimising transaction costs and reducing principal-agent problems. Such arrangements are based on mutual trust. Agreements are self-enforcing to the extent that firms run the risk of eroding trust, and thus possibly drop out of the network, if they behave opportunistically.

In the perspective of innovation economics (Rosenberg 1982, Freeman 1994), co-operation between firms is a crucial feature since innovation is a cumulative process, involves learning-by-doing, -using, and -interacting, and often yields increasing returns. Particularly important is learning-by-interacting. There is both an empirical and a theoretical argument behind the emphasis innovation economics puts on learning-by-interacting. Behind the empirical

argument is the notion that the most frequent type of innovation, namely incremental innovation, is not an event but a process of continuous improvements. The process of incremental innovation takes up speed as a development trajectory of a given technology becomes established (Dosi 1982), that is as an increasing number of researchers and firms agree that a given technology is preferable compared to other technologies. After this (often implicit) agreement, two things happen. First, there is less uncertainty, i.e. the risk that investment in R&D will have to be completely written off because a given technology has to be dropped is minimised. Second, an increasing number of researchers concentrate on improving a given technology, and a mesolevel structure of research groups or institutes, training courses and textbooks, norms and standards, etc. is being created.

The theoretical argument addresses the issues of opportunity costs and increasing returns. The alternative to inter-firm co-operation in innovation would be an autarchy approach, i.e. each firm tries to go through its own research effort and learning processes. In a certain way, this occurs in the real world; it is usually referred to as the *not-invented-here-syndrome*. This approach involves high opportunity costs as firms could have avoided replication and repeating dead-end tracks by learning from the experience of other firms.

In the view of innovation economics, the issue of transaction costs involves the different forms learning-by-interacting can take. Formal technology transfer, e.g. by licensing, is one of them. However, as the use of technology implies a lot of tacit knowledge, no technology transfer contract can define all the details that are involved; it can try to define as many as possible, something that would be extremely costly in terms of drafting, supervising and enforcing the contract. The alternative is a combination of formal agreements and informal communication; in particular the latter has often been observed inside clusters. Moreover, there are other forms of technological learning based on communication between firms, e.g. discussions in standardisation bodies or at congresses. These mechanisms have low transaction costs.

2.2 Co-operation between firms and supporting institutions

Co-operation between firms and supporting institutions involves individual firms, or groups of firms, on the one side and business associations or governmental, private, or PPP institutions on the other side.

A well-developed business association ought to display a number of features:

- It articulates the interests of the private sector vis-à-vis government. It has well-functioning communication channels with its member firms to know about things it has to articulate.
- It offers services to its member firms. The two basic services of Chambers are the emission of certificates of origin and legal advice. Beyond this, both Chambers and

sectoral associations may offer information services (overall economic climate, economic trends in the sector, changes in government regulations, statistical data, etc.), seminars on specific issues (e.g. new management techniques or technologies), training courses, and fora for information exchange between member firms.

- It has a number of qualified professionals in order to offer services in a competent manner. The relationship between professionals and elected directors is balanced. There is a degree of internal transparency and democracy which makes sure that different types and sizes of firms are represented in the association.

Business support institutions, be they governmental, private, or public-private partnerships (PPP), operate in fields like training, technological support, financing, and export promotion. They ought to display the following features:

- They have a clear customer focus and well-established communication channels with the customers.
- Frequent feedback leads to constant evolution and development of the services offered.
- They are organized in a business-like way, both to make their mindset compatible with that of their customers and to improve efficiency.
- They have systems for quality management and knowledge management in place.

A firm's decision whether or not to co-operate with associations and business support institutions involves a decision-making process which is similar to the make-or-buy decision. Membership in an association has a cost, both in terms of membership fees and possibly opportunity cost due to time spent as an elected officer. A firm will weigh this cost against the benefit, and it will opt against membership if it feels that there are more efficient alternatives, such as direct lobbying with political decision-makers or acquisition of business services from commercial providers. Regarding support services, there is always the option of living without them, or finding other sources (e.g. suppliers or technology consultants in the case of technological services, or commercial providers in the case of business information), or generate these services in-house.

2.3 Co-operation between the private and the public sector

Successful, dynamic clusters display a close, constructive relationship between the private and the public sector.² This may be the result of a development-oriented public sector, but more often it reflects effective collective action and lobbying by the private sector. The public

2 See the case study on the ceramic tile cluster in Castellón, Spain, which is a model case of a successful cluster, in Meyer-Stamer, Maggi and Seibel (2001).

sector supports the competitiveness of firms. It streamlines its operations, reduces red tape, and sets up one-stop- or first-stop-agencies. It extends and maintains the infrastructure. It offers real services to firms, especially in fields which are rarely profitable and where collective action may fail due to free-riding behavior, such as training.

Moreover, the public sector may play a strategic role. It may take a leadership role in moving from "passive" to "active" cluster advantages,³ and it may pursue a deliberate strategy to strengthen the cluster, for instance by attracting complementary firms. In other places, where clustering is not yet expressive, public actors may pursue a cluster-oriented economic promotion strategy, for instance by stimulating the emergence of technology poles.

3 Typical obstacles for co-operation

In order to identify typical obstacles to co-operation, it is useful to look at each of the three main areas of potential co-operation. Table 1 summarizes the argument.

Table 1: Obstacles to co-operation in clusters

<i>Obstacles to co-operation between firms</i>	<i>Obstacles to co-operation between firms and supporting institutions</i>	<i>Obstacles to co-operation between private and public sector</i>
Prisoner's dilemma in an un-cooperative environment	Difficult relationship between SMEs and associations, in particular chambers	Local governance issues (political rivalry, collective conservatism, role of chambers)
Costs and risks of co-operation	Common problems of co-operation between firms and supporting institutions	Global governance issues (externally owned firms, foreign buyers)

3.1 Between firms, 1: Co-operation and prisoners' dilemma

Co-operation between firms involves a special type of prisoners' dilemma. In the textbook constellation, there are two prisoners who have jointly committed a severe crime without leaving evidence, may be pursued for a small crime where evidence against them is available,

3 "Collective efficiency is defined as having two aspects to it: external economies that clustered agents accrue by virtue of their location, and joint action benefits that arise from deliberate cooperation between local agents. I view external economies as the 'passive' dimension of collective efficiency (Nadvi, 1996). The term passive describes the nature of ties required between local agents in order to obtain externality gains. In contrast, joint action is the 'active' dimension of collective efficiency requiring deliberate and active cooperation. These two aspects can also be clearly linked; joint action by some agents can generate cluster-specific externality gains for others (Nadvi, 1996). This process of upgrading by facilitating the flow of technical information on standards and by assisting in managerial training. Local institutions can also play a potentially key function in defining and regulating local product standards, and thus in creating a reputational basis for the cluster's products. This provides a powerful example of what I refer to as 'externalities of joint action'" (Nadvi 1999, 1608).

are interrogated separately and offered a reduced sentence if they confess (blaming their partner). Both may confess (i.e. behave opportunistically, non-cooperatively), and both will then be condemned to full sentences. If they co-operate, i.e. avoid opportunistic behavior, they will only be sentenced for the small crime.

In a cluster, the a-priori-constellation is quite different from the textbook prisoner's dilemma. Rather than acting jointly, firms are fierce rivals. Unlike the textbook prisoners' dilemma, it is not personal preferences and features or coincidences which will determine the decision for or against opportunistic behavior but a long history of rivalry which will create a strong bias towards non-cooperation.⁴ Typical events in the evolution of a given cluster will reinforce this bias, for instance the emergence of spin-off-firms which cater towards the same customers, and whose founders may take trade secrets from their former employer with them.

Another important aspect is the stability which both constellations, co-operation and non-cooperation, tend to display. Moving from one constellation to the other is complicated. This is most obvious if one starts with non-cooperation. Isolated attempts of individual actors to co-operate will evoke opportunistic behavior by other actors, thus disappointing the co-operation pioneers and reinforcing the non-cooperative game. But the co-operative game is quite stable as well, as Axelrod (1997) has shown that even repeated opportunistic behavior will not necessarily destroy a co-operative game.

Empirical research on prisoners' dilemma has shown that the probability of co-operation is higher than 50 % in repeated games as actors learn that opportunistic behavior is detrimental. The stability of the co-operative game is further enhanced if direct communication is possible and if the game is further stabilized through two mechanisms: rules (and sanctions if rules are broken) and the emergence of trust. In a non-cooperative cluster, the basic constellation is quite different, especially if many firms produce more or less identical products. Everyday business behavior will tend to be opportunistic, as firms are desperate for sales. If firms are competing for the same customers they will tend to underbid each other; it is not by chance that in his early publications Porter (1990) emphasized the importance of rivalry for cluster dynamics. Ironically, this disposition may become even stronger in a period of crisis, when co-operation might offer a way out (for instance via a collective effort to upgrade) but when opportunistic behavior is even more likely as firms are scrambling for survival. From both a theoretical and an empirical perspective one thus has to expect the emergence and reinforcement of non-cooperative games in clusters, and any kind of cluster initiative has to be based on the assumption that it will be very difficult to switch to a co-operative game.

4 In a case-study on clusters in Santa Catarina, Brazil, I have identified a number of additional factors which created disincentives for inter-firm co-operation (Meyer-Stamer 1998).

3.2 Between firms, 2: Costs, benefits and risks of formal co-operation

In the view of the industrial researcher, clusters offer all kinds of opportunities. The perspective of the businessperson will often be the opposite. He may or may not appreciate the advantages, such as easy availability of inputs and skilled workers, and easy access to customers. He certainly is fully aware of the disadvantages, such as loss of skilled employees and swift diffusion of information about new technologies, customers, or markets. Regarding formal networking and co-operation, be it within an association or some other type of collaborative venture, any decision has to be based on an assessment of benefits on the one hand and costs and risks on the other hand. And quite often, the benefit will be long-term and hypothetical, whereas costs and risks are obvious and immediate. For a firm, the most obvious risk is the loss of trade secrets, such as technology or knowledge regarding markets and customers. Such risks are an important motive for firms not to enter co-operative ventures with direct competitors.

Another relevant risk regards anti-competitive behavior. Many firms basically like the idea of co-operation, in particular if it involves the creation of market-power or the elimination of market processes, such as purchasing or sales co-operatives or even cartels. Such practices are common in many industries, and in countries with an operational anti-trust-policy many firms will have a clear idea of the costs of such co-operation, namely the fines they had to pay. In fact, in this respect firms may find government agencies which promote clustering and co-operation somewhat strange, and may prefer to distance themselves from such initiatives as long as the anti-trust implications are not resolved.

Direct costs of co-operation include first and foremost transaction and opportunity costs. Meetings have to be prepared, and there has to be some follow-up, and discussion papers and minutes have to be prepared. All this puts a strain on the scarce time resources of decision-makers in firms. If firms agree on concrete activities, this will generate further costs, e.g. the investment and operational costs of joint development projects. This may lead to the kind of problems which are well-known from R&D and training, i.e. a discrepancy between the individual and the collective benefit which leads to underinvestment. In the field of R&D, governments subsidize firms' activities. Likewise, it may be necessary for government to subsidize co-operative ventures, i.e. cover at least part of the transaction and opportunity costs.

3.3 Problems of co-operation between firms and supporting institutions

There are basically two kinds of problems regarding co-operation between firms and supporting institutions. First, there is often a complicated relationship between firms and business associations, especially between SME and chambers of industry and commerce. SME often perceive, correctly or not, that chambers are dominated by large firms, and they feel that the support they receive from their chamber is inadequate. At the same time, the

chambers often have to deal with expectations which they cannot meet, given their limited resources.⁵

Second, there are the usual problems of co-operation between firms and supporting institutions. For many supporting institutions, the satisfaction of local customers from the private sector is not the only, and often not the most important, performance indicator. This problem is particularly pertinent in the case of training and technology institutions; a priori, it is not necessarily likely that they co-operate with firms (Meyer-Stamer 1997). In education and training institutions, especially in higher education, academic merits play an important role. But R&D institutions also have a difficult job balancing the demands of private sector customers and academic criteria, something which is further complicated by profoundly different standards – researchers want to publish their results quickly and widely, and they aspire a profound understanding of problems, whereas firms want a quick problem solution, want to keep research results secret, and possibly sell them at a maximum price. Moreover, co-operation is more likely with large firms, which often have elaborate training centers and usually have R&D laboratories and thus an appropriate receptive structure, than with SME.

3.4 Problems of co-operation between public and private sector

Both local and global governance issues establish limits for cluster initiatives. Local governance patterns establish manifold problems:

- It has sometimes been observed that a crisis lead to a dynamization of cluster potentials (see, for instance, the Criciúma case in Meyer-Stamer 1998). However, it is by no means obvious that this happens. Just as likely the opposite may happen. Local actors may perceive a profound crisis as a structural crisis, they may define the dominating branch in the cluster as a sunset-industry which does not deserve promotion, and they may direct their promotion activities at diversifying the local economic base, preferably achieving broad diversification in order to avoid the vulnerability of depending on just one branch. In other words, local actors may perceive a de-clustering policy as the best option.⁶
- Another constellation has been observed in old clusters, for instance the Ruhr Valley (Grabher 1993). Communication and co-operation between local actors may become so intense that their ability to perceive changes outside the cluster suffers (collective conservatism). Moreover, they tend to be well organized and politically well connected. Accordingly, they have both the motivation and the means to focus at efforts to keep old industries alive rather than promoting and shaping structural change.

5 For instance, see Müller-Glodde (1993) for a description of the traditional model of chambers in Brazil.

6 This was a typical feature of textile and garments clusters in Southern Brazil which are described in Meyer-Stamer (1998).

- One important actor will only with great difficulties play a constructive role in cluster initiatives, namely chambers of industry and commerce. Chambers cater to firms from all sorts of sectors and branches. A cluster initiative will involve only a limited set of branches, and those firms not directly linked to the dominating branches in the cluster will feel frustrated if the chamber puts much effort into the cluster initiative. Especially in those locations where one cluster dominates the local economy, the firms from other branches will complain loudly since they tend to perceive that the chamber is dealing too much with the cluster-related branches anyway.⁷
- There is no reason to believe that politically motivated differences can more easily be overcome at the local level than at other levels. It is rather likely that political differences are intertwined with other factors, such as personally motivated aversions, traditional enmity between families or elites, economic rivalries, etc., and that thus a complex set of obstacles emerges which makes organizing a coherent initiative very complicated.⁸

Global governance patterns create two types of problems for local initiatives:

- A crucial element of cluster initiatives is networking between persons rather than organizations. This may face serious obstacles in a cluster where important firms are not locally-owned, and directors are changing frequently. Moreover, in large groups the director of a local branch plant frequently has a limited freedom of decision. In this respect, dramatic changes in framework conditions for clustering initiatives can occur if a local firm is taken over by some external investor.⁹
- External firms can also have a strong impact on cluster initiatives in a different way. Clusters, especially in developing countries, are often part of global value chains which are ruled by some large firm elsewhere, for instance large distribution chains in industrialized countries. Such a large firm may have an interest in the long-term perspective and performance of the cluster, but usually its short-term considerations will prevail. This frequently means that external buyers are playing cluster firms against each other to get the best price, or that they discourage cluster firms to engage in upgrading efforts which might change the power structure in the value chain.¹⁰ This leads us back to the observation that fierce rivalry between local firms is often a major obstacle for local co-operation. Moreover, it means that even well-meaning government initiatives may stay fruitless.

7 I have observed this phenomenon both in clusters in Santa Catarina, Brazil, and in the Ruhr Valley, Germany.

8 On the political obstacles to local competitiveness strategies in Santa Catarina see Meyer-Stamer (1999), in the state of Northrhine-Westphalia, Germany, see Meyer-Stamer (2000).

9 For instance, this has been described by Dörre (1999) for the metal engineering and electrical equipment cluster in Nuremberg, Germany, and by Kremer (1999) for the paper industry cluster in Düren, Germany.

10 For the case of the footwear cluster in Rio Grande do Sul, Brazil, this has been described by Schmitz (1998).

4 Promoting Innovation in Clusters

What makes promoting innovation in a cluster different from promoting innovation elsewhere? The answer is straightforward: Apart from all the things one can do everywhere, in a cluster there is the option to activate the potential of innovation based on "collective efficiency", something that is no option in other locations.

4.1 Promoting Social Innovation

I have argued above that promoting innovation in a cluster which does not have a tradition of co-operation, where local actors find the idea of "collective efficiency" implausible, involves two different kinds of innovation: not only technological innovation but also social innovation. The social innovation of transforming a non-cooperative into a cooperation-minded setting is not necessarily a precondition for initiatives to promote technological innovation. But increasing the propensity to co-operate is both in itself an important measure to unleash innovative potential and a precondition to increase the leverage of other measures. How, then, is it possible to increase the propensity to co-operate in the three areas outlined above?

Regarding **inter-firm co-operation**, I have found that such initiatives are most likely to succeed which meet four criteria:

- they address immediate problems of firms,
- they do not touch what firms perceive as their core activities,
- they open little or no latitude for predatory behavior,
- they offer the potential of savings through economies of scale.

Let me explain these criteria by briefly outlining typical activities which do not meet them and usually fail. First, there is technological co-operation, such as the joint development of a new production process. In such a case, participating firms fear that other firms get to know pieces of information which they perceive as essential to their competitiveness. Accordingly, they put pressure on their technicians not to unveil any possibly critical information, what in effect means that it is unlikely that the co-operation project gets anywhere. Firms may also choose their less competent technicians to take part in the project, something that also does not enhance the probability of success. Second, when one mentions the option of co-operation, businesspeople in a non-cooperative cluster typical come up first of all with ideas which effectively are anti-competitive, such as forming a purchasing co-operative. However, if firms do not trust each other, a supplier who is the target of the co-operative will easily break it by offering preferential purchasing conditions to one or some of the participating firms.

What then are activities which meet the four criteria? In my research in clusters in the state of Santa Catarina, Brazil (Meyer-Stamer 1998), I have found three types of activities:

- Training. Even though surprisingly many firms opted for in-house training (even when it came to basic education for semi-literate employees), there were numerous examples of joint training activities. The economies of scale are obvious, the benefits as well, there is little option for predatory behavior, and the training is limited to areas which do not touch upon the core activities.
- Environment-related activities. In this area co-operation between firms involved a level of exchange of information between firms which was unthinkable in areas such as quality management or technological development. Apart from being due to the fact that firms, initially mostly sticking to end-of-pipe-solutions, perceived environmental protection literally as a peripheral activity, the fact that there was the government environmental agency as an external enemy also created an incentive to stick together.
- Basic testing activities. In the textiles industry this refers to testing cotton fibers and chemical inputs, in the ceramic tile industry to testing the clay. In fact, in the ceramic tile cluster around Criciúma, which is the leading cluster in the industry in Latin America, it was after a major crisis in the early 1990s that firms lobbied their business association and state government to create a technology center which had testing as one of its main activities. The crisis forced firms to look out for potentials to save costs. Before that, each firm had its own underutilized laboratory.

Looking at the evolution of the clusters in Santa Catarina, it is possible to perceive that initiatives like those just mentioned may pave the way for more ambitious co-operation activities. As firms see that co-operation creates advantages, they may develop a certain degree of trust which permits other, more ambitious and risky co-operation activities, such as exchange of technological information. However, there is by no means a clear trajectory in this respect. The experience of the tile cluster in Criciúma is somewhat sobering: After a massive joint effort to deal with the crisis achieved most of its declared goals by the mid-1990s, the degree of co-operation has been decreasing again (Meyer-Stamer, Maggi and Seibel 2001). Whereas four years ago several of the local actors saw their cluster on track to emulate the experience of Italian industrial districts, today one can sense a certain frustration which may be due to the fact that maintaining co-operation is quite an effort.

Regarding **co-operation between firms and institutions**, it is useful to distinguish two issues. First, there are business associations. In Brazil, like elsewhere in Latin America, business associations tend to be relative weak, with few employees and a low level of competence, especially when it comes to providing member firms with real services. Organizational development in such associations is a lengthy but unavoidable activity. Regarding the case of Santa Catarina, there was a German technical assistance project which after five years of hard work was quite successful. The methodology it had developed was

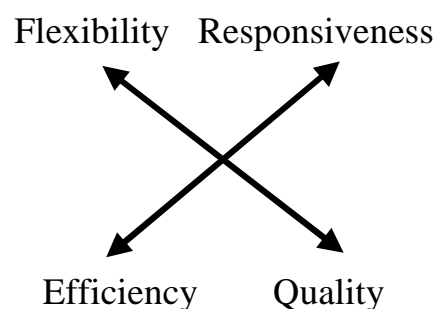
first extended to other parts of the state and recently to other parts of the country, with financial and organizational support of the parastatal SME support organization SEBRAE.¹¹

Second, there are institutions such as training and technology institutes. In the past, such institutions in Brazil tended to operate in a kind of vacuum and were highly auto-referential. In the import substitution era, i.e. until 1990, technology institutes found little demand from the private sector which was under little pressure to innovate in a not very competitive market. Training institutes encountered an environment which was marked by massive skills shortages so that whatever training they provided was gladly accepted by the private sector. Even though a large part of the vocational training system was administrated by the private sector itself the possibilities of firms articulating their specific demands vis-à-vis the training institutes were often very limited. With a new, more competitive environment, institutions have to face tough challenges.

In order to get a better understanding regarding how to make supporting institutions more responsive to private sector demand, it is useful to use a concept that has been implicit in much of the restructuring which took place in firms in the 1990s. Figure 1 summarizes four key goals of organizational development: efficiency, quality (in the sense of minimizing the cost of quality management), flexibility (i.e. the ability to satisfy a wide scope of differentiated demand), and responsiveness (i.e. the ability to respond quickly to demand).

In the old days, optimizing the factors mentioned in Figure 1 involved trade-offs. Increasing flexibility often went to the detriment of efficiency, responsiveness went to the detriment of quality, and so forth. It was the main contribution of the Toyota production system to show industrial managers how to optimize all four factors at the same time (Womack, Jones & Roos 1990).

Figure 1: Four dimensions or organizational development



There is no reason why this idea should not be applicable to supporting institutions in fields such as education, training, and technology. Sure, it will often involve major upheaval in organizations which so far had a single-minded rationale, e.g. academic excellence. But

¹¹ See <http://www.fe.org.br>.

getting to a balance between different rationales is exactly the point of organizational development.

Co-operation between the private and the public sector puts high demands on both sides. On the side of the private sector, it is, first and foremost, essential to have effective organizations. Large firms can interact with government, especially local government, on an individual basis. Small and medium-sized firms will find this difficult. They will have to unite their voices to be heard; this leads us back to the issues mentioned before in terms of creating effective business associations.

On the side of the public sector, the first issue is that it has to take an active interest in the fate of the private sector. This is much less obvious than might be expected. In Brazil, I have found that local government often did not care about private business, except as a source of revenue (Meyer-Stamer 1999). First, private businesses had been growing for decades without support from local government, and second, there had been all sorts of policies from central and state government so that local government developed a disposition to wait for their action rather than acting on its own.

The second issue is that government, before starting cluster initiatives, ought to get its own house in order. Government at all levels tends to erect all sorts of obstacles for private business – some of them essential and in fact important to stimulate competitiveness, such as environmental regulation and consumer protection, but many of them either inefficient or altogether not very sensible. Reviewing regulation, removing those obstacles which are not essential, and reorganizing what remains is the most important task for government. In practical terms this means different things at different levels, such as moving from command & control to economic instruments for environmental policy at the national level, streamlining regulations at all levels, or creating one-stop or first-stop-agencies at the local level.

Only after addressing the obstacles it has created for the private sector does government have the credibility to get involved in meaningful private sector promotion activities, such as a cluster initiative. Government agencies at the local or regional level can play two important roles in this respect. First, they can act as moderators, mediators, and facilitators, i.e. provided they have competence and credibility they may play a crucial role in overcoming mistrust among firms. Second, they may cover part of the transaction costs any co-operative venture incurs. In this respect, the justification is pretty much the same as in terms of government support for R&D. In a microeconomic perspective the costs of co-operation will often be substantial whereas the benefits are hypothetical, and the appropriability may appear dubious. Therefore, firms will tend to underinvest in co-operation.

4.2 Promoting Technological Innovation in Clusters

It is not particularly difficult to come up with long lists of activities regarding how to promote innovation in clusters. More or less everything government and non-governmental actors can

do to promote innovation in general can be done with respect to a given cluster (see Figure 3), and a number of instruments are specific for application in clusters (Table 2). Accordingly, any actor who wants to launch an innovation initiative in a given cluster will encounter a substantial body of literature which provides him with a broad menu of possible instruments; Table 3 presents a number of them. What is somewhat less developed is the body of literature which addresses not the question of *what* to do but rather *how* to do it, i.e. the issue of methodologies to secure an effective implementation of instruments.

When looking into successful cluster-initiatives and asking for critical success factors one often finds idiosyncratic factors – strong leadership by some charismatic local actors, a strong sense of community, strong personal relations between key actors, and the like. But parachuting a charismatic leader into a cluster to start an innovation initiative does not appear like a particularly sound proposal – it is not exactly a methodology, and charisma is often acquired through successful action. What comes to mind in terms of thinking about methodologies is the whole set of participatory methods which have been developed in fields such as community development and which are labeled "action research", "participatory rapid appraisal", or "participatory learning and action".¹² Such approaches have a number of distinct advantages:

- being participatory, they tend to be bottom-up, addressing motivational issues as a crucial element,
- they are explicitly learning-oriented and thus superior to traditional sequential, planning-oriented approaches,
- they are highly flexible and thus permit to include whatever motivation and issue comes up in the process of an unfolding cluster-based innovation initiative.

Using such instruments is not always easy, since resistance from certain actors has to be overcome. Government officials sometimes find the idea of participation questionable and prefer hierarchical approaches. Researchers tend to find such approaches not sufficiently "scientific". Nevertheless, in our work in Brazil, stimulating local competitiveness initiatives, we have found these approaches extremely useful.¹³

12 For an overview see www.parnet.org.

13 I have been involved in the development of two such methodologies: Participatory Appraisal of Competitive Advantage (PACA) for local economic development efforts, and Rapid Appraisal of Local Innovation Systems (RALIS) with a focus on technology and innovation. Manuals for both methodologies are available at my website, <http://www.meyer-stamer.de>.

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Figure 2

Please rate the importance of specialized organizations (e.g. associations of firms, specialized institutions, or specific cluster organizations) in coordinating the following activities among firms in the cluster.

(Very Important = 5, Important = 4, Moderate = 3, Unimportant = 2, Very Unimportant = 1, No Activity = 0)

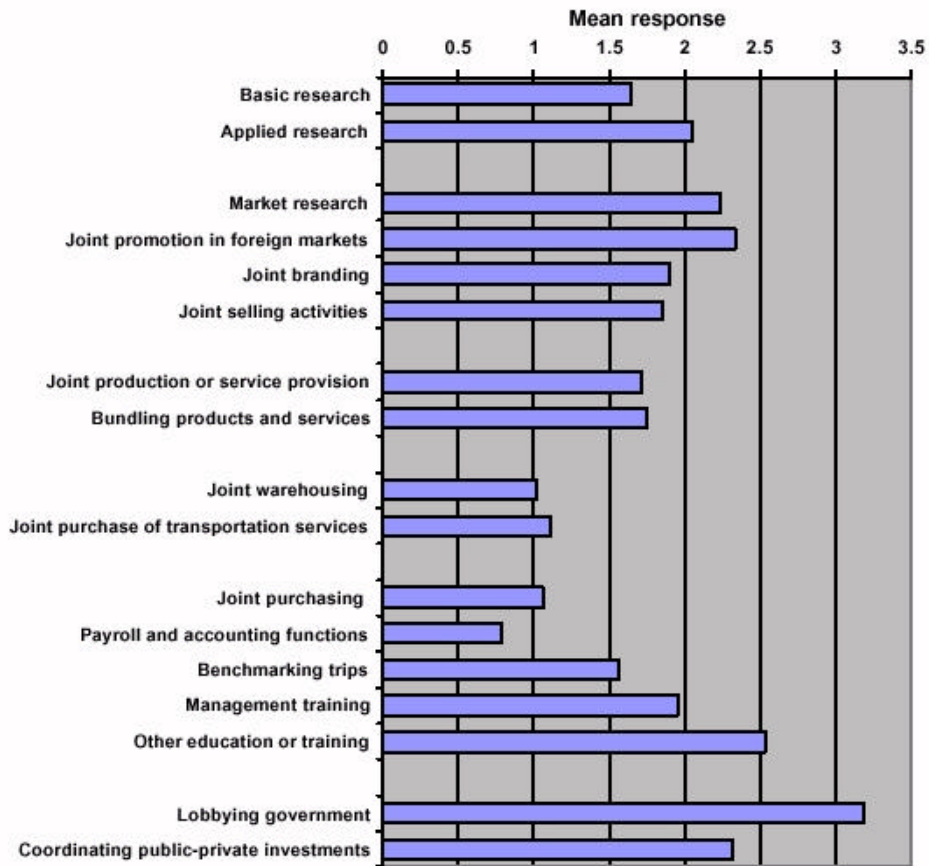
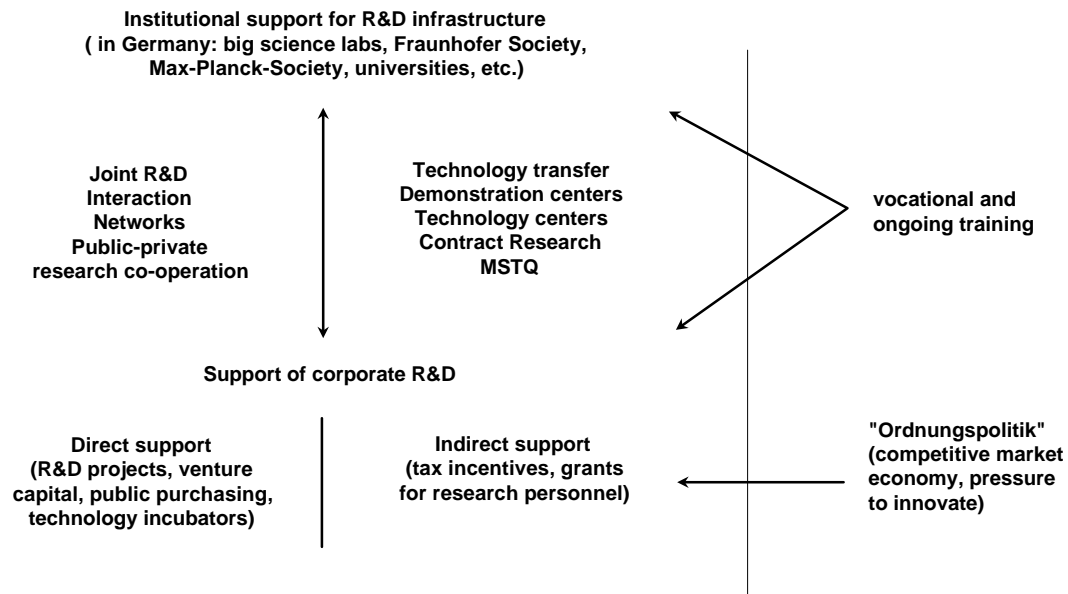


Figure 3

Conventional instruments of technology policy



(c) Meyer-Stamer

Table 2: Common features of cluster-based policy in OECD countries

- Vigorous competition and regulatory reform policy
- Providing strategic information through technology foresight studies, cluster studies, special research groups, or special Web sites
- Broker and network agencies and schemes
- Cluster development programmes
- Joint industry-research centres of excellence
- Public procurement policy
- Institutional renewal in industrial policy making
- Providing platforms for constructive dialogue

Source: Roelandt & Hertog (1999), 421.

Table 3.
Cluster Promotion: The Role of Different Actors

Who?	What?	How?
Central government	Encourage inter-firm relationships	<ul style="list-style-type: none"> • Value-added tax rather than cumulative sales tax • Realistic regulatory framework: licensing, labor, taxation, safety, environment (no incentives for informality or semi-formality) • Transparent proceedings of public administration • Transparent and efficient foreign trade procedures
	Direct support firms: technology	<ul style="list-style-type: none"> • Finance decentral activities on a competitive basis • Create a decentralized, efficient structure in areas such as MSTQ and technology extension
	Direct support to firms: finance	<ul style="list-style-type: none"> • Finance decentral activities on a competitive basis
Regional government	Encourage inter-firm relationships	<ul style="list-style-type: none"> • Public purchasing policy geared at groups / consortia of SME
	Direct support to firms: technology	<ul style="list-style-type: none"> • Technology demonstration centers • Extension service
	Direct support to firms: finance	<ul style="list-style-type: none"> • Credit guarantees for firms with strategies and projects formulated in the context of regional development strategy • Subsidizing networking initiatives to cover transaction costs
Local government	Encourage inter-firm relationships	<ul style="list-style-type: none"> • Involve groups of SME and their associations in formulation of local development strategy • Public purchasing policy geared at groups / consortia of SME • Establish technology incubators
Business associations	Stimulate information exchange between firms	<ul style="list-style-type: none"> • Establish sectoral and topical working groups, managed / moderated by association's professionals • Organize seminars with external speakers • <i>Bolsa de subcontratación</i>
Research institutions, universities, training institutions	Direct support to firms: education and technology	<ul style="list-style-type: none"> • Tailor-made training courses for groups of SME • Dissemination of technology information
Medium and large firms	Supplier development	<ul style="list-style-type: none"> • Individual assistance to suppliers • Training courses for groups of suppliers