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**Pilot Programme for the Promotion of Environmental
Management in the Private Sector of Developing Countries
(P3U)**

**Inter-Firm Cooperation in
Environmental Management:
Experience from Santa
Catarina/Brazil**

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Abbreviations

ACI	Industrial and Trade Associations
ACIJ	Associação Comercial e Industrial de Joinville
BADESC	Banco do Desenvolvimento do Estado de Santa Catarina
BNDES	National Development Bank
BRDE	Banco Regional do Desenvolvimento do Extremo Sul
CFC	Clorofluorcarbons
FATMA	Foundation for the Environment
IBAMA	Brazilian Institute of Environmental Renewable National Resources
R&D	Research and Development
SC	Santa Catarina

1 Preface

This present desk study is part of an exploratory study on the diffusion of eco-efficient production practices among enterprises in Brazil, focusing on the role of and potential for group-centred approaches such as “waste minimisation circles”. The study - result of the first phase of the project - is based on the author’s broad experience in technological and industrial management issues in Brazil, especially in the southern States, as well as on the in-depth study of the approaches and results of two German Technical Cooperation projects in Curitiba and Joinville. The second phase will include a field study designed to put the hypothesis to a practical test and to elaborate recommendations regarding P3U’s future activities in the area of group-centred approaches.

The supraregional *Pilot Programme for the Promotion of Environmental Management in the Private Sector of Developing Countries (P3U)* of GTZ aims at elaborating an integrated concept for the promotion of environmental management and at testing it by way of example in selected countries. This concept is supposed to be demand-driven and consensus-based and expected to enhance environmentally sound production processes and products in developing countries, thus contributing to the prevention and reduction of negative environmental impact caused by industry. P3U is presently elaborating four instruments of environmental management with different approaches, which are to be used by Small-and-Medium-Sized Enterprises (SME). The common features of these instruments are that they can be implemented easily and at low cost, effectively be used by a wide range of enterprises, and be combined with other instruments of environmental management as well as integrated into different methodological approaches, such as group-centred learning.

The pilot programme P3U had *two motives* to undertake the present study:

- Studying existing experience with the dissemination of cleaner production and environmental management programmes in developing countries, P3U recognised that there always seem to be major problems in diffusing successful examples widely and achieving an extended application in industry, esp. in SME.

- When analysing successful approaches, the Indian “waste minimisation circles” seemed rather effective in motivating entrepreneurs to undertake, organised in groups, ongoing efforts to reduce waste, thus mobilising self-help potential and using scarce and expensive external consultancy capacities in a much more cost-effective way than traditional consultancy to individual firms.

The *objective* of the study, which originally was intended to cover both Brazil and India, is

- to determine factors that might prove or have proved to hamper the process of diffusion of eco-efficient production approaches and practices in the industrial sector in developing countries, esp. among SME,
- to explore the reasons and circumstances under which a broader diffusion of eco-efficient production approaches in industry has been and may be successful in SME of developing countries, in particular by using group-centred approaches.

The part on India had to be separated from the overall approach due to technical problems with the consultants. The Brazil case is on good track and P3U is eager to know more about the potential to apply group-centred approaches in environmental management in Brazil. The final study should be ready by May 1998.

2 Introduction

There is a rising interest in the issue of inter-firm cooperation, not only but also in the context of environmental management. Behind this interest is the observation that collective learning among firms is an efficient means of advancing technology. This observation is based on the analysis of profoundly different ways of inter-firm cooperation, including strategic alliances and industrial districts.¹ The more recent development policy discussion has particularly focused on successful industrial district experiences as they have shown that even small and medium-sized firms can go through rapid technological learning processes if they are embedded in a dense network of relations with related firms (as well as, of course, supporting institutions in the technology and training area). However, it is important to note that there are thousands of clusters, i.e. spatially agglomerated firms of the same sector, but only few industrial districts, i.e. agglomerated firms with a high degree of both formal and informal inter-firm cooperation. Thus, a cautionary remark is in place regarding inter-firm cooperation: It is by no means natural that firms cooperate. On the contrary, firms, especially clustered firms, see each other first and foremost as competitors, and often business-owners see each other as personal rivals. It is only under specific circumstances that firms understand that it is not only possible but perfectly sensible to compete and cooperate at the same time.

In this paper, I will present a practical experience of inter-firm cooperation in environmental management: the *Núcleo do Meio Ambiente* of the *Associação Comercial e Industrial de Joinville (ACIJ)*, i.e. the environmental working group at the Chamber of Industry and Commerce in Joinville / Brazil. It is both an interesting and relevant experience for a number of reasons:

- It occurs in an environment where firms, as a rule, do not cooperate very much. It is thus helpful in terms of understanding under which circumstances firms can overcome an attitude of competition, if not fierce rivalry, that inhibits any kind of cooperation in technical or business matters.
- It is part of a larger and methodologically useful approach to stimulating both inter-firm cooperation and organizational development in a business association which has been initiated by a technical assistance project. It is thus more than a chance event.

In section 2, I will give a brief overview of the núcleo's background, i.e. the state of Santa Catarina and the industrial cluster of Joinville. In section 3, I will explain why firms have to deal with environmental issues, namely government action and pressure from customers abroad. In section 4, I will discuss what the economic logic

1 For an overview see Meyer-Stamer (1997), p. 163 ff.

of inter-firm cooperation is in a theoretical perspective, why this logic did not apply in Brazil in the import substitution era, and how this is changing with the transition to an open economy. In section 5, I will describe the work of the núcleo and the change process in the ACIJ of which it is part and parcel.

3 The Joinville cluster

Santa Catarina (SC) is one of the three states of Southern Brazil, being located between Paraná and Rio Grande do Sul. SC's performance in terms of industrial development was more dynamic than in the rest of Brazil in the 1980s; this is, for instance, being reflected in a strong export performance (Figure 1). Industry is clustered in SC. There are five major clusters where the larger part of industry is concentrated (Figure 2):

- The metal engineering and electromechanical cluster. Major products are household appliances, electrical motors, compressors, transport equipment, and car parts. It is located in the coastal region in the northeastern part of the state; the largest city (which is actually the largest city of the state) is Joinville, which was founded by German immigrants in 1855. The development of the cluster was initiated by individual entrepreneurs in the 1930s.
- The textile cluster with the main products casualwear and home textiles. The main location is the Itajaí Valley in the northeastern part of the state; the largest city there, Blumenau, was founded by German immigrants in 1850. The development of textile industry, which started in 1880, was initially a chance event due to the arrival of immigrants who were experienced in this trade and sensed a business opportunity.
- The food processing industry in the western part of the state, which specializes in broilers and the processing of chicken and pork. It is based on cooperation between a few large processing firms and a huge number of small farmers who raise the animals. This industry was started in the 1950s, mainly by Italian immigrants.
- The ceramic tile cluster around the cities of Criciúma and Tubarão in the southern part of the state. It also started on the basis of individual entrepreneurship of Italian immigrants in the 1950s.
- The furniture cluster in the northeastern interior region around the city of São Bento do Sul.

Another branch of industry which is strong in SC is the manufacturing of plastics products. This industry is dispersed over the state.

It is important to note that actors have profoundly different notions regarding clustering in different regions. It is undisputed both among local and external actors that Itajaí valley is a textiles region. Things are different in Joinville. Although it is obvious to the external observer that Joinville is predominantly a metal engineering and electrical equipment cluster, local actors tend to perceive the local industrial structure as highly diversified since it also includes two major textiles and two large plastics companies. Table 1 gives an overview of the leading firms in Joinville.

<i>Firm</i>	<i>Activity</i>	<i>Turnover (R\$ million, 1995)</i>
Multibrás (Consul) *	Refrigerators	1,360
Embraco *	Compressors for refrigerators	436
Fundição Tupy *	Foundry parts for cars	354
Tigre *	Plastic tubes for plumbing	300
Döhler *	Home textiles	127
Nielson *	Buses	105
Docol *	Plumbing equipment	n.a.
Akros *	Plastic tubes for plumbing	65
Schulz	Compressors	56
Wetzel *	Aluminium and iron foundry	42

Source: Gazeta Mercantil, Balanço Anual 1996/97. 1 R\$ is about 1 US\$. * = member firm of the *núcleo do meio ambiente*.

4 Why should firms care about environmental management?

Firms in Joinville have to care about environmental management for two reasons: government control and pressure from customers abroad.

4.1 Government control

Brazil adopted an environmental legislation in the course of the 1980s. Among other factors, this was due to pressing environmental problems like the massive pollution problems in the city of Cubatão, close to Santos. Cubatão, where the first pole of Brazil's petrochemical industry as well as other pollution-intensive firms (steel, fertilizer) have been built since the 1950s, is unfortunately located in a valley with a

limited exchange of air; it enjoyed the dubious fame of being the world's most polluted place in the 1970s. The situation has improved substantially since the 1980s.

Today, environmental laws and regulations exist at all three administrative levels, i.e. the federal, state, and municipal level. At federal level, the organization in charge is IBAMA (Brazilian Institute of Environmental Renewable National Resources). At state level, the organization in charge in SC is FATMA (Foundation for the Environment). At municipal level there is a secretariat in charge of environmental issues.

In general terms, there are two main activities of environmental agencies. First, they issue licenses for the planning, construction, and operation of industrial facilities. Second, they supervise the compliance of firms with environmental legislation and regulation. In terms of industry and environment, FATMA is the more active agency (as IBAMA focuses more on protecting natural reserves). Its headquarters are located in the capital of SC, Florianópolis. There are eight regional offices with about 20 - 30 employees; overall, FATMA had 220 employees in April 1996.

The main field of activity of FATMA is protection of water resources. FATMA was founded in 1975 and reorganized in 1987. Initially, its predominant pattern of behavior had been to react to complaints (according to the firms these were both complaints of neighbours and of business rivals). Since 1987, it has tried to act in a more systematic manner, in particular by formulating environmental action plans, especially for basins. Main activities have been registration and mapping of basins, recovery of hydro-resources, and protection of basins. As the textiles industry is a particularly water-intensive industry, and used to be a highly water polluting industry (especially in the printing, dying, and finishing stage of the production process), it was both one of the main sources of environmental damage in the Itajaí valley and the Joinville region and a major target of FATMA's activities. Yet other firms also got under closer surveillance, and had to invest in wastewater treatment.

FATMA has recently started to change its mode of interaction with firms. While relations with firms used to be conflictive in the past, it now tries to build a partnership. The main instrument is the joint formulation of firm-level action plans. In such action plans firms commit themselves to attain certain reduction levels within a given period of time, typically between 6 and 24 months. An important aspect of the process of formulating an action plan are public meetings involving the neighbours of a given firm, introducing an additional element of pressure on the firm and of control of compliance.

The new pattern of FATMA behavior is made complicated by the fuzzy definition of responsibilities between it and IBAMA. As IBAMA can also act in the area of supervision of firms, it can happen (and has actually happened) that IBAMA controls

and fines firms which do not meet emission standards but have agreed with FATMA on an action plan. Such occurrences alienate firms from the public sector.

Access to credit is an additional incentive for firms to comply with environmental standards. The by far most important source for medium- and long-term-credit in Brazil is the National Development Bank (BNDES) and its regional agencies, in the case of SC BRDE and BADESC. Access to their credit depends on a clearance from FATMA.

Apart from state level institutions and activities, environmental questions have also become an issue of municipal legislation. In Joinville a local code has been passed that establishes specific environmental standards within the municipality.

4.2 Customer pressure

The other reason to get involved with environmental management is customer pressure. This applies mainly to large firms in the textile industry that have been exporting to the European market, particularly the German market, where ecological concerns seem to play a larger role than elsewhere. Initially, customer pressure was targeted at eliminating certain inputs like allergenic dyestuffs and hazardous chemicals used in the finishing stages. Afterwards came pressure to introduce clean production, particularly by reducing effluents. This led to the introduction of ecological management systems; one of the textiles firms in Joinville was among the Brazilian pioneers in preparation for ISO 14.000 certification.

In the case of another firm (which is the world's No. 3 manufacturer of compressors for refrigerators) pressure for environmental adjustment regarding its product came from the legal ban on CFCs.

5 Why should firms cooperate?

In this section I will first discuss, in a general perspective, why there might and should be cooperation among firms. Cooperation is by no means a natural feature of business-life given the fact that firms are, first and foremost, competitors. I will then look at firms in SC and address the question why they cooperated very little in the past. Finally, I will discuss how cooperation has emerged, albeit slowly, after profound changes in the macroeconomic environment.

5.1 Learning-by-interacting: The theoretical rationale of cooperation

It is now a well-established fact that learning-by-interacting is one of the key elements of technological learning processes at firm level. There is both an empirical and a theoretical argument behind the emphasis innovation economics is putting 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, 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 minimized. Second, an increasing number of researchers concentrate on improving a given technology, and a dedicated 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 and transaction costs and increasing returns. The alternative to inter-firm cooperation in innovation would be an autarchy approach, i.e. each firm trying to go through its own research effort and learning processes. In a certain way, this does even occur in the real world; it is usually referred to as the *not-invented-here-syndrom*. 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.

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 involves 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. Moreover, there are other forms of technological learning based on communication between firms, e.g. discussions in standardization bodies or at congresses. These mechanisms have low transaction costs.

Agreement between various actors – firms, researchers, and others – on a given technological trajectory can create the preconditions for increasing returns. There are both increasing returns to scale due to a large number of firms and researchers improving the same technology, i.e. returns for the producers, and to adoption of a given technology, i.e. returns for the users.

5.2 The logic of uncooperative behavior in the import-substitution era

Given the logic of cooperation in technological development it may come as a surprise that it does not happen often. In the particular case of industrial firms in SC, the overall level of cooperation in the import-substitution phase was very limited. This referred, first of all, to commercial inter-firm transactions which were very limited. For instance, medium- and large scale textiles and clothing firms are usually completely integrated. As firms did interact so little commercially, an isolation-oriented business culture emerged and other possible areas of cooperation were not exploited either. Even in areas where the logic of collective action would seem obvious and where the state plays an inadequate role, firms minimized cooperation. For instance, many textiles and clothing firms have been under pressure to set up wastewater treatment stations. In this area the logic of collective action due to economies of scale is obvious. In fact, in one of the municipalities, Brusque, eleven firms joined forces to set up a common wastewater treatment station. In the other regions all the major firms set up individual stations (which have a price tag of between US\$ 4 and 8 million). Literacy programs for workers are another example of missed opportunities. Only in one municipality, Jaraguá do Sul, firms, together with the Association of Commerce and Industry and the local government, have set up a joint training program (firms send pupils and contribute funds, and the state provides teachers). In all the other municipalities, firms have at best achieved individual contracts ("convênios") with the local government or are pursuing this effort in a totally isolated manner.

There are two ways to explain the low level of interaction between firms. First, it might be that firms behaved randomly and irrationally. Second, it might be that firms behaved boundedly rational, and that under the given conditions non-cooperation was rational behavior. There are numerous observations which appear to verify the second argument.

First, there was the simple fact that in many areas there just were no suppliers, or suppliers were unreliable, or showed predatory behavior. For instance, a constant complaint among downstream metal engineering firms used to be that state-owned steel mills used to deliver their product in the quantity, the quality, and at the moment they found convenient rather than according to the orders of their customers; this has only changed since the privatization of these firms in the early 1990s. It is also important to understand how price formation and placement of orders worked in the high-inflation past. Suppliers used to adjust their prices every three months or more often. So there was a strong incentive for the customer to place his order on day 89, that is on the day before the price adjustment. A typical reaction of suppliers to this kind of behavior was to try to cheat on quality or quantity, or to delay delivery, claiming a machine breakdown, a power cut, or some other contingency. All in all, relations between suppliers and customers used to be quite hostile.

Second, every firm operated in an extremely turbulent environment. There was a lot of upstream and downstream turbulence due to the factors mentioned before, and there was an extremely unstable and unpredictable macroeconomic environment. This was not only due to high inflation, but also and in particular to frequent attempts of the government to deal with this.² Economic stabilization plans caused turmoil all across industry as firms tried to understand the new rules of the game; and even minor interventions like changes in price adjustment rules, foreign exchange regulations, or changes in interest rates and credit regulations used to cause a lot of trouble for firms. There was a strong incentive for firms to try to insulate themselves as much as possible from this environment, and vertical integration was one means of doing this.

Third, the regulatory environment used to be, and actually continues to be, complex, contradictory, and not transparent. It is in fact almost impossible for an entrepreneur to be a law-abiding citizen, respecting all tax, safety, and other regulations that exist.³ This means that entrepreneurship in Brazil tends to involve a certain degree of clandestinity, i.e. a firm has various things to hide at any given time. This creates a posture where firm owners and managers are suspicious of any contact that goes beyond arms-length business transactions. Firm owners repeatedly stated that this is one reason why they would not let anybody enter into their firm, or would not enter into any kind of information exchange with other businessmen.

Fourth, many firm-owners pointed out that their firms had been extremely profitable in the closed-market environment, so that the question arose what to do with those profits.⁴ Here the local culture comes in where status was derived from economic success rather than the demonstration of riches. Firm owners did not necessarily lead a frugal lifestyle, but the amount of money they could sensibly spend for consumptive behavior was limited. One option always was to acquire real estate, but apparently not too many firm owners opted for this, at least not big-style. Another option was financial investment, and local hearsay has it that a few firms have opted for this (it was not possible to verify this point as firms were extremely unwilling to discuss their financial situation, and published data corroborated this only for a handful of firms). The preferred option was to use the money for vertical integration. So if, say, a clothing firm suffered from unreliable suppliers of fabric, it would not necessarily make up a sound calculation whether it made sense to invest into this

2 In their institutionalist analysis of the Brazilian business environment, Stone, Levy & Paredes (1992, 18) found that in times of crisis around 40 % of orders used to be renegotiated between firms.

3 Cf. Stone, Levy and Paredes (1992).

4 Profitability of industry has been high in Brazil all through the 1970s and 1980s (Meyer-Stamer 1997, 48), largely due to the low level of competitive pressure and the necessity to finance investments internally as long-term credit was only available from BNDES.

activity but rather decided that it would be a good and sensible thing to take last year's profit and acquire a number of looms.

Fifth, there was no penalty on limited efficiency in the past closed-market environment. Competition was fairly limited in most product markets, and where it existed the main competitive weapon was heavy advertising rather than good quality or low prices. In fact, low-price strategies in final products markets were not feasible in the high-inflation environment that existed until 1994 because customers just would not notice; shops adjusted their prices at different points in time, so that there were vast price differences for a given product between shops anyway, and customers were already quite annoyed with that. Under these circumstances it would have been hard to try to convince customers that a particularly low price for some product was the result of a deliberate low-price strategy rather than just delayed adjustment to inflation.

As there was no penalty, firms could pursue idiosyncratic strategies rather than having to converge to some kind of best practice. This did not only apply to vertical integration but also to inter-firm cooperation and interaction with supporting institutions. Inter-firm cooperation always involves some transaction cost, and businesspeople may find this cost quite high, not the least because it involves emotional stress in a fairly small community where all people know each other, and many are in fact related, have a long history of intra-family feud, and find each other thus quite annoying. Moreover, cooperation, in particular in terms of deliveries and subcontracting, will necessarily involve conflicts from time to time. Also, endless haggling between firms on price and delivery conditions was not unusual as long as cooperation was no acute necessity. The same problems apply to interaction with supporting institutions, which is exacerbated by the usual problems of interaction between private firms and public institutions with a different logic of action, for instance regarding time-horizons.

It seems plausible to argue that firms' attitudes regarding core activities will also shape their behavior regarding other activities. In other words, if firms do internalize as much of the production process as possible, it is not likely that they will engage in cooperation in other fields, like technological cooperation or business associations. As the local business culture in SC emerged as one of isolationism and extreme individualism, cooperation among firms was limited in all possible fields of activities (with the exception of community involvement).

5.3 The changing logic of cooperation in a changing environment

One of the important insights of our research⁵ was that fundamental changes in the macroeconomic framework do not necessarily, and certainly not immediately, lead to fundamental changes in the firms' behavior. This is an important finding given the fact the economic orthodoxy would suggest rapid adjustment because of a new set of incentives.

There are two main reasons for the persistence of traditional behavior. First, firms may not perceive that given changes are truly fundamental. In our case, firms were familiar with the fact that the government made a lot of noise about stabilization and reform efforts, which however rarely ever amounted to much. Therefore, what appears as a fundamental change in an *ex-post* perspective, namely the move from import substitution to an open economy in 1990, did not appear as an obviously dramatic move at that time. It took some time until firms realized that, first, government actually stuck to its strategy of opening-up (something that was not predictable given the stop-and-go-policies in other areas), and that, second, this opening-up affected them in a dramatic way.

Second, there is path dependence. Even if firms have realized that the framework conditions have changed dramatically, they will not necessarily start to change themselves dramatically, too. They rather try to adjust by intensifying their established behavior. In the concrete case of numerous firms in Santa Catarina this meant that they tried to cut costs. Initially, they usually did not question the overall way of running the firm, i.e. particularly the level of vertical integration; they did not move to more active strategies, like trying to upgrade their product spectrum; and they did not question their pattern of cooperation, or rather non-cooperation, with other firms.

It was only after some time that more fundamental changes started in those industries which had come under severe pressure. This first happened in the ceramic tile industry which had entered into a crisis in 1989/90 due to macroeconomic turbulence. As firms struggled for survival, two main actors in the cluster managed to convince firm-owners that cooperation was a promising way of enhancing competitiveness. In practical terms this meant that firms used business associations much more intensively for joint learning processes, and that firms and their associations joined forces to lobby for the creation of mesolevel institutions.

The textile and clothing industry was the next to come under pressure, mainly due to the opening-up of the market and the success of the anti-inflation plan in 1994. The prevailing adjustment pattern was cost-cutting. It took about two years until some

5 See Meyer-Stamer et al. (1996).

firms started to understand that this was not sufficient. The owner of the largest firm took the initiative of getting some medium-sized and large firms together in order to discuss more fundamental ways of adjustment. One of his initiatives was to organize, in late 1996, a trip to Italian industrial districts to learn about the possibilities of inter-firm cooperation. Further activities included a joint benchmarking exercise and the creation of a database on suppliers' sales conditions and payment patterns by customers.

To sum up, we may note that uncooperative behavior was perfectly rational in the import-substitution era. It is therefore not surprising that industrial clusters in Santa Catarina did not display the usual characteristics of industrial districts, like a high level of specialization in each firm and accordingly a strong division of labour, and strong interaction based on trust.⁶ Moreover, during the transition from import substitution to an open economy firms follow their traditional behavioral pattern, something that is rational from a microeconomic standpoint. It is only with a certain delay, under intense external pressure, and due to the involvement of key actors that firms start to mobilize the potential provided by clustering, i.e. try to use closer cooperation as a means of enhancing competitiveness.

6 Stimulating cooperation: The role of the business association

6.1 The *Núcleo do Meio Ambiente*

The place where the most significant part of inter-firm learning in environmental issues takes place is – apart from user-producer interaction – the *Núcleo do Meio Ambiente* of the *Associação Comercial e Industrial de Joinville (ACIJ)*, i.e. the environmental working group at the Chamber of Industry and Commerce in Joinville. The núcleo started its work in 1992, building on an earlier informal group where technicians from about 20 firms were dealing with problems of industrial solid waste. There are various distinguishing features about the núcleo:

- The núcleo meets regularly, i.e. every two weeks for a meeting of two to three hours.
- The núcleo has been working on a broad range of environmental management issues.
- The work of the núcleo is accompanied by a consultant. He is an engineer with experience in both the private and public sector and now an ACIJ employee. His

6 See Schmitz and Nadvi (1994) for an overview of the discussion on industrial districts.

main tasks are to organize the meetings of the núcleo, to moderate the meetings, and to pursue the follow-up.

- The núcleo is using visualization techniques in its meetings (*Metaplan*), this being a key feature of núcleo work in general. The introduction of these techniques is the result of a German technical assistance project (see below).

The participants in this núcleo are engineers or technicians from the environmental departments of medium-sized and large firms. In the case of those firms which do not yet have an environmental department, technicians in charge of utilities or safety take part. The núcleo agrees on an annual schedule of topics to be discussed. Topical discussions may be based on presentations of members of the núcleo, as well as presentations of representatives of equipment suppliers, governmental environment agencies, or other organizations. Apart from topical discussions which take place at the ACIJ building the núcleo meets occasionally at one of the participating firms in order to get a first-hand impression of certain equipment or management schemes.

Environmental departments have been created in a number of firms over the last three years. Before, certain employees at the firms were in charge of environmental issues. Their job definition was mainly to make sure that the firm got fined as little as possible. It was only with the creation of environmental departments that the environmental strategy of firms went from end-of-pipe to integrated approaches, initially prevention and eco-efficiency and then integrated environmental management.

The núcleo has played an important role in profoundly changing the type of relationship between firms and state control agencies, especially FATMA. Relationships used to be hostile in the past and have been changing towards a cooperative style recently. Two examples illustrate the new kind of relationship that is emerging.

- In 1996 FATMA intended to create a new register of industrial polluters. Initially the idea was to follow the usual practice, i.e. to set the register up without much consultation with firms. In this case, the núcleo heard about FATMA's intentions and set up a special commission to discuss FATMA's concept, which in the end it came up with a series of proposals for modifications which then were discussed with FATMA.
- In 1997 the núcleo started to discuss with FATMA how to resolve problems in the field of wastewater emissions. A substantial number of firms do have wastewater treatment stations, but there is no continuous supervision of their emissions. The usual practice was that FATMA checked occasionally, sometimes getting data which were far away from the average as there had been temporarily a high level

of pollution. FATMA then fined the firm, causing frustration as the firms felt that they had already done a lot by setting up the wastewater treatment station. The solution that was found in discussions between the núcleo and FATMA was that in some cases firms set up their own control systems while in other cases FATMA establishes a continuous control system. In those cases where firms control themselves the data have to be handed on to FATMA, and FATMA is entitled to check the control system occasionally.

Cooperation between firms is not without hazards, and the separation between the núcleo and a second núcleo, which involves environmental consultants and salespeople, was the outcome of an event that showed what the hazards can be. Some time ago, a salesman had sent an offer for some environmental equipment to one of the member firms of the núcleo. The technician who was in charge of environmental issues in the firm asked the salesman to turn up for a technical discussion of the offer. The salesman felt that his offer left little to be discussed, felt offended, and called the president of the firm, telling him that his environmental engineer was divulging business secrets at the núcleo. The engineer was fired.

Also, the núcleo has established the rule that FATMA employees may take part in meetings when this is appropriate but that they cannot become formal members of the núcleo.

6.2 Organizational development in a business association: Role and instruments of technical cooperation

Technical assistance has played an important role in stimulating inter-firm cooperation in SC, not only in the environmental field. In 1991, a partnership project between the Chamber of Arts and Crafts of Munich and Upper Bavaria and a number of ACIs in the northeast of SC was started.⁷ Initially, the project was meant to create conditions for upgrading micro and small firms. In the view of medium and large firms which were dominating the ACIs, the low level of competence of micro and small firms was a general nuisance as it reduced quality of life due to inadequate consumer services and products, like bread for example, and it was a specific problem to the extent that micro and small firms were suppliers or service providers. The main thrust of the project was, in the initial phase, to stimulate joint learning between micro and small firms by means of establishing núcleos, mainly on a sectoral basis. It was only in the process of these exercises that local actors realized that the organizational structures and capacities of ACIs were inadequate, too. They used to be clubs of medium-sized and large firms with little systematic lobbying and hardly any services for member firms. Setting up núcleos was a first step to change

7 For details see Müller-Glodde (1993).

this. First, providing the consultants who managed the núcleos implied a substantial amplification of the services provided by the ACIs. Second, with the change in the work going on inside the ACI, and with an increasing number of professionals employed, the ACIs moved from honorary organizations to professionalized organizations. Third, the núcleos demanded both more services from the ACIs (like more and better information provision and PR work) and much intensified lobbying.

In the context of the núcleo do meio ambiente, two features of the project are important. First, new methods of organizing meetings came with the project, especially the use of visualization techniques, something that is common practice in German technical assistance projects. They have proved to be very helpful in structuring and democratizing discussions, raising more creative potential, and making planning and monitoring more easy. In the specific case of SC, participants in núcleos and other meetings have reacted positively to this method.

Second, the whole process of organizational development in the ACIs stimulated by the project caused changes in the local business culture. Inter-firm cooperation had been largely absent before. With the project, an increasing number of núcleos, both on a sectoral and topical basis, were created, and the núcleos delivered, i.e. they often had a very quick positive impact on the base line of the participating firms. This did not go unnoticed among firms that did not participate, thus creating an incentive to create more núcleos, i.e. a virtuous circle – business culture changed from a trajectory of non-cooperation to a trajectory of cooperation.

7 Open questions

In this paper I have given a brief overview of the activities of the *núcleo do meio ambiente* in Joinville. It was based on evidence collected during field research on clustering and competitiveness in March / April 1996 and additional conversations in August 1996 and 1997, including an interview with the consultant in charge of the núcleo in August 1997. As the underlying research did not aim primarily at environmental management issues and experience with this specific núcleo, a number of issues and questions remain open, for instance:

- What are the specific environmental management instruments used by the firms, and what is the importance of environmental issues in overall firm strategy?
- To what extent do participating firms introduce core proprietary knowledge into the núcleo discussions?

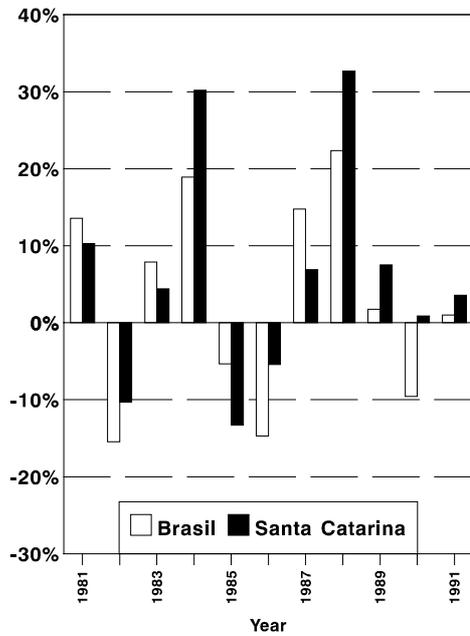
- What is the relative importance of the núcleo work compared with other sources of knowledge, e.g. training courses, suppliers of equipment, technology institutes, or inter-firm cooperation outside the núcleo?
- What kind of conflicts emerge between participants in the núcleo, and how are they dealt with?
- To what extent and under what conditions is this experience replicable, i.e. what is the role of locally and historically specific circumstances? For instance, is it applicable to firms which are much further away from world class manufacturing than those involved in the núcleo, especially small and medium-sized firms?

Bibliography

- Meyer-Stamer, Jörg:** Technology, Competitiveness and Radical Policy Change: The Case of Brazil. London, Portland Or.: Frank Cass, 1997 (GDI Book Series No. 9)
- Meyer-Stamer, Jörg et al.:** Industrielle Netzwerke und Wettbewerbsfähigkeit. Das Beispiel Santa Catarina / Brasilien, Berlin: German Development Institute, 1996
- Müller-Glodde, Rainer:** Organisationsentwicklung in brasilianischen Unternehmensverbänden. Fallstudie des Partnerschaftsprojekts zwischen brasilianischen Handels- und Industrieverbänden in Santa Catarina und der Handwerkskammer für München und Oberbayern. Eschborn: GTZ, 1993
- Schmitz, Hubert, & Nadvi, Khalid:** Industrial Clusters in Less Developed Countries: Review of Experiences and Research Agenda. Brighton: IDS, 1994.
- Stone, Andrew, Levy, Brian, & Paredes, Ricardo:** Public Institutions and Private Transactions. The Legal and Regulatory Environment for Business Transactions in Brazil and Chile. Washington: World Bank, 1992 (Policy Research Working Papers, WPS 891).

Figure 1

**Annual change in exports:
Santa Catarina and Brasil**

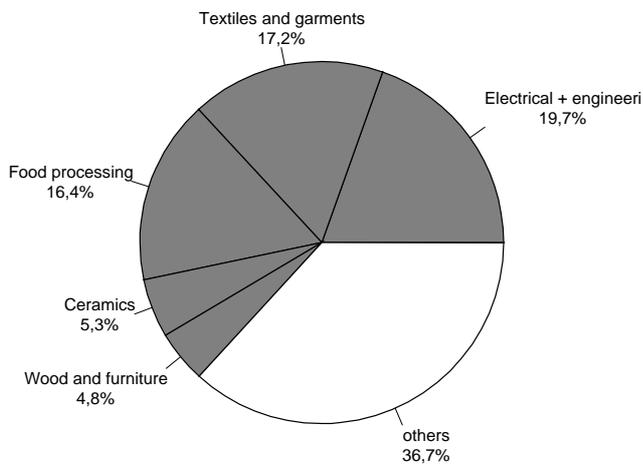


Source: DECEX.

GDI

Figure 2

Santa Catarina: Structure of industry



According to VAT contribution, 1994. Source: FIESC

© GDI

Member firms of the núcleo

1. Affonso Meister S.A
2. Akros Ind. de Plastico Ltda*
3. Britagem Vogelsanger Ltda*
4. Buschele e Lepper S.A
5. Campeã S.A Ind. Têxtil*
6. Carrocerias Nielson S.A
7. Cia Fabril Lepper
8. Cia Ind. H. Carlos Schneider
9. Cipla Ind. de Materiais de Const.*
10. Cromagem Galvanobril Ltda
11. Docol Ind. Com. Met. Sanit. Ltda
12. Döhler S.A Com. e Ind.
13. Embraco S.A
14. Engepasa S.A
15. Escola Técnica Tupy
16. Indústria de F. Tupy Ltda
17. Interfibra Ind. S.A
18. Intrasul Ind. de Trat. Superf.
19. Kavo do Brasil S.A
20. Malharia Manz Ltda
21. Multibrás S.A*
22. Sabroe Tupiniquim Ltda*
23. South Chemicals Ltda
24. Tecnofibras S.A*
25. Tecnored Tec. Aut. Ltda
26. Tubos e Conexões Tigre Ltda
27. Wetzel Fund. de Ferro S.A
28. Boreal Tratam. de Superfícies
29. Ind. de Bebidas Antartica
30. Termotécnica Ltda
31. Scala Têxtil*

Source: ACIJ

Types of inter-firm cooperation: Experience from Brazil

The 1991 partnership project between the Chamber of Crafts of Munich and Upper Bavaria and various industrial and trade associations (ACIs) in Santa Catarina/Brazil focused, among others, on the promotion of inter-firm cooperation. The ACIs founded núcleos (working groups), which are mainly organized according to branches, in some cases according to topics, and comprise 6 to 12 member firms. A consultant, who is employed by the respective ACI, organizes and moderates the activities of the núcleos. In the beginning the major problem was to overcome the deep-rooted mistrust and anti-cooperation attitude of the firms. The work of the consultants and the commitment of the individual entrepreneurs who identified themselves with the aim of achieving more inter-firm cooperation were instrumental in this process. Another helpful factor was the consistent application of Metaplan techniques, which helped to stimulate discussions, involve all participants and to structure the results. After some núcleos had overcome mistrust, established a regular working mode and achieved first improvements in the firms' performance, numerous others were founded. Their number rose from 20 in early 1993 to 103 in early 1996, and they now comprise 1,386 member firms from 45 different branches.

Types of núcleos

Architects	Metal workers
Bakers	Butchers
Banana farmers	Dairies
Timber tradesmen	Furniture manufacturers
Building contractors	Model builders / fiber glass
Services trade	Fashion people
Printers	Surface finishing of furniture
EDP mechanics	Personnel issues
Software producers	Sawing mills
Energy saving	Carpenters
Exporters	Secretaries
Gardeners	Technical schools
Poultry farmers	Textile printing
Foundries	Tourism
Tradesmen	Environmental protection
Hotels and restaurants	Voluntary and firm-owned fire brigades
Industry and quality standards	Management consultants
Journalists	Female entrepreneurs and entrepreneurs' wives who work in the firm
Car mechanics	Insurance brokers
Pastry-cooks and confectioners	Toolmakers
Clothing manufacturers	Brickworks
Canning industry	Ornamental plant cultivators