



# **EFFLUENT TREATMENT PLANTS**

Nove and Arzignano - Leather and Ceramics

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## 1 INTRODUCTION

At a time when environmental consciousness is growing rapidly in the industrialised countries and when eco-labelling is demanded with mounting determination, reducing the environmental impact of production is becoming a pressing need for industries throughout the world. In the case of SME clusters such a need acquires greater urgency because of the degree of sectoral specialisation and of the limited financial capacities of the individual entrepreneurs. Under such conditions, the inability to reduce the environmental impact of production reduces the competitiveness not only of a handful of producers but of the entire local economy. As a result, a conflict may emerge between environmental protection and economic viability, challenging the very notion of sustainable economic development.

Remarkably similar problems were confronted at the end of the 1970s in many Italian districts. This paper is an attempt to reflect upon the institutional solutions which were identified and implemented in two such districts, namely the ceramics district of Nove and the leather district of Arzignano, both of which are located in the Veneto region. The paper has also a more ambitious purpose, namely to uncover how the establishment of consortial solutions to environmental problems influenced the institutional set-up of the two districts. In order to gain some insight inside such issues, it is however necessary to describe how a public-private partnership was established with the purpose of responding to the collective challenge faced by the district. Only at a later stage will it be possible to understand to what extent the creation of a water processing plant can be analysed not only as the institutional response to an existing challenge, but also as the starting point to elaborate strategies for the entire district.

The paper is organised as follows. Section 2 provides an introduction to the key features of the Italian legislation on water pollution. Section 3 and 4 introduce the two case studies relating to the districts of Nove and Arzignano. The presentation of the two institutional initiatives will be chronological and it will provide the elements for the comparative analysis attempted in section 5. Particular emphasis will be given to the following themes: a) the perception of a collective challenge, b) the emergence of a collective solution, c) its implementation, and d) its institutional evolution. The identification of policy guidelines will be attempted in section 6 where an ideal-typical path to the establishment of a water treatment plant in a developing country is presented.

## 2 THE LEGISLATION

The evolution of all institutional responses to environmental problems need to be related to the peculiarity of the legislation on these issues. In both the cases reported in this paper, the **single most influential element** behind the realisation of the effluent treatment plants was the risk of seeing an important component of the local economy becoming the target of judiciary actions and of significant fines. Furthermore, the passing of environmental legislation invariably acted as the **catalyst for the mounting unrest** of the local population and the trigger for the most visible forms of protest. For the purpose of this paper, reference will only be made to the legislation on water pollution. Both the **leather and the ceramics industries are characterised by a heavy environmental impact** a) because of the need to wash repeatedly output through many of its production phases and b) because of the use of heavy chemical components in the manufacturing process. As a result effluent waters cannot be pumped into the main sewage network unless they are passed through preliminary treatment facilities to deprive them from the toxic compounds which would otherwise wreck a standard treatment plant. Leather manufacturing, furthermore, releases in water a great deal of biological compounds, which, while not toxic, are very unpleasant to see and to smell.

The key legislative initiative in the field was first passed in Italy in 1976 and it became operative in 1979. The law sanctioned the public value of clean water and it identified the chemical and biological compounds which could endanger water life. It needs to be stressed that the Italian law focuses upon the **concentration of pollutants** in the effluent water rather than on the total amount of pollutants released into the environment over time. A micro-sized artisan workshop dealing in ceramics or leather therefore fares as a worse pollutant than a large enterprises undertaking a less polluting process, even if the latter effectively releases into the environment a much larger amount of waste over the same period of time. As a result of this peculiarity, all producers operating in industries with a significant environmental impact felt the burden of the legislation since the end of the 1970s.

The 1976 law led to two major developments with SME clusters. First of all it made it clear that the existing water treatment **technology was shaped around the needs of the large-scale industry**. As such it was characterised by significant fixed

costs and by the need to sustain large throughput and thus beyond the reach of the *individual* SME owner. Secondly, it introduced the principle that the **polluter had to bear the cost of water treatment**, which could not therefore be socialised (i.e. borne by the collectively). The joint impact of these two features of the legislation appears as the single strongest force behind the establishment of cooperative initiatives within SME clusters characterised by significant environmental impact.

### 3 THE EFFLUENT TREATMENT PLANT OF NOVE (VICENZA)

The effluent treatment plant located near the village of Nove services the producers from the local ceramic SME cluster as well as a range of SME enterprises located in the area near Bassano del Grappa. The facility **is owned by a consortium** (CADA - Consorzio Artigiano Depurazione Acque<sup>1</sup>) which was established by the artisan association of Vicenza in 1981 to help the artisan enterprises of Bassano solving their effluent water problems<sup>2</sup>. Initially, over 150 firms supported the consortium and paid for that purpose the relatively low subscription fee<sup>3</sup>. Such an enthusiastic response may appear surprising at first sight and its features deserve to be spelt out. With reference to section 2, the reader needs to be reminded that by 1981 water pollution legislation was in full operation (since 1979). Micro-scaled enterprises operating in industrial sectors such as ceramics, wood-crafting, painting and auto repair were heavily exposed to fines because of the toxic nature of the chemical compounds they were making use of, albeit in very small amounts. As a result of their concentration in a densely-populated small-scale urban area<sup>4</sup>, the entrepreneurs who

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<sup>1</sup> Artisan Consortium Water Purification

<sup>2</sup> As from its statute, CADA can process water from enterprises operating within the Region and, up for a third, from non-artisan enterprises (small-, medium- and large-scale ones). In order not to interfere with the endeavours undertaken by its counterparts in neighbouring provinces (recall that all producers' association are organised on a provincial basis which is further coordinated at a regional level), the artisan association has preferred to focus upon the producers located in the province of Vicenza. For quite obvious reasons, the bulk of CADA's clients are currently located in the proximity of the facility.

<sup>3</sup> Actually only about 20 such entrepreneurs signed the statute of the Consortium, while the rest rapidly paid in their subscription fees.

<sup>4</sup> In 1991 the area around which the facility gravitated (namely the clusters of Bassano del Grappa and of Marostica) held over 150,000 inhabitants with a population density of 284 inhabitants per square kilometre (against a national average of 188 and a regional average of 235). Bassano del Grappa (locally the largest urban concentration) holds however no more than 35,000 inhabitants: as such is one of the clearest examples of the 'urbanised countryside' which is among the key distinguishing features of much of the Third Italy.

participated in the constitution of CADA had found themselves among the easiest targets of the environment protection agencies operating locally<sup>5</sup>.

**Individual attempts** to tackle the problem of water pollution had been undertaken over the previous two years, albeit with little success. Privately-operated waste treatment facilities proved widely beyond the reach of most artisans because of their very high costs compared to the low water volumes to be processed. Secondly, attempts to pre-treat effluent water in-house had generally failed because the technology was insufficiently geared to the needs of small-scale producers. As such, it required the producers not only to bear considerable fixed costs but also to forgo large amounts of space within their workshops. The solutions identified by the individual artisans were therefore proving to be nothing but short-term fixes. A **collective challenge** was therefore slowly emerging within the cluster.

The artisan association was in a privileged position to contemplate the mounting dissatisfaction of many micro-sized producers. Rarely did they present to their association the clearly-defined demand for a support initiative. Most commonly, they voiced their distress towards the environment protection agency<sup>6</sup> arguing that the viability of their business was challenged. Initially, the artisan association envisaged CADA as an attempt to provide its members with an **“institutional shelter”** from the environment protection agency. Its line of reasoning was simple: the public opinion and the local institutions were more likely to display some ‘flexibility’ if they could be convinced a) that the artisans had taken the problem of water pollution seriously (i.e. that they were not trying to dodge the law) and b) that any lasting solution required significant investments (i.e. it took time and possibly some public sponsoring). While *individually* the artisans had little hope to achieve such a result, as an organised group they certainly did.

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<sup>5</sup> Typically, the entrepreneur would need to ask for a permit to discharge water into the main sewage network directly to the township where his or her workshop was located. The request needs to be completed with a certified chemical analysis of a water sample which needs to satisfy the requirements set at a national level (by the 1979 law). Workshops can also be the target of random water tests performed by the local health authority - Unità Sanitaria Locale

<sup>6</sup> Repeatedly the key target of the unrest was the township administration that would refuse the permit to discharge effluent water into the main sewage network and therefore required separate treatment. As a result, a climate of distrust typically characterised the relationships between the artisan and the local authorities. It therefore took a great deal of investment (of the time and resources of the Artisan Association) to convince the artisans that the local institutions shared an interest in the well-being of the local economy and that they could therefore participate actively to attempts to solve the mounting environmental problems. The role of producers’ association with respect to such issues should not be under-emphasised.

Over the following years, **CADA operated simultaneously on two levels**. On the one hand, it contacted the local public institutions and it put forward a stylised project for the establishment of a dedicated waste management facility. The regional government proved by far most responsive institution at this stage providing significant insurance that it would co-finance the project for up to 50% of its costs. Secondly, the consortium signed an agreement with a waste management facility operating locally. The purchase of a bulk quantity of water to be processed ensured a discount on processing costs. Such a feature was crucial because it enabled the associated artisans to invest in the construction of those water storage tanks within their premises which still constitute the core of the effluent processing system.

By 1985, CADA had gained over 350 associates and the need was emerging to **realise its own treatment facility**<sup>7</sup>. Not only was the amount of water to be processed growing steadily, but the most senior members of the artisan association were increasingly convinced that dependency upon an external provider could in the long run expose the members of the consortium to monopolistic pressures. CADA and the artisan association jointly identified an adequate site within the township of Nove and purchased it. Liaison with the township administration were immediately initiated to acquire the necessary authorisations. In 1986, CADA put forward a tender for the definition of the project of the facility and it assembled a group of well-respected professionals operating in the region (University professors, consultants, civil servants) to scrutiny the various options. By November of the same year the township administration granted the necessary building permits. In the early months of 1987 the construction of the waste management facility was under way.

At first sight it may appear that it took an awfully **long time** (over six years) for the consortium to become fully operative. First of all, it needs to be reminded that over the first few years the constitution of the consortium was intended more as a **political than as operative move**. Indeed, the 150 associates of CADA represented a

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<sup>7</sup> The purchase of the plot as well as the realisation of the treatment plant was co-funded by the Region and by the members of CADA for a total cost of 1.5 Lit billion (little less than 1.5 million 1996 USD). As far as the artisans are concerned, their association devised a scheme to differentiate among its members according to the historic amount of effluent water discharged. The subscription fees thus devised ranged from Lit. 400,000 to Lit. 1,200,000 (from 450 to 1300 1996 USD). Such one-off subscription did not entitle the artisan to use the treatment facility (in order to do so he or she would have to pay a further fixed annual subscription plus a tariff proportional to the amount and the characteristics of the water effectively processed) and it was meant to fund the initial investment. The one-off subscription charged was scrapped in 1991 and the artisans who affiliated after that date were not requested to pay it.

significant *political* constituency but they were clearly far too few to bear the significant start up costs for a waste management facility even with the match-up funds from the regional government. Secondly, it took time to devise and implement a **viable system to collect water** from the associates and to deliver it to the treatment facility. As the first few years passed, the viability of the technical solutions was disclosed and the number of associates increased. Thirdly, the artisan association had to invest quite a big deal of its own financial and human resources to **sensitise the artisans** about the advantages stemming from direct ownership of a waste treatment facility especially in terms of a) insuring themselves against malpractice suits and b) exercising some control upon pricing policies. In the end, the late 1980s proved that the contributions of the artisans could not match the financial requirements of the project originally presented to the Region. CADA had therefore to work out an acceptable compromise with the local institutions<sup>8</sup>.

By March 1988 the facility was terminated. After the necessary tests, the facility came into full operation in the early months of 1989. It was soon awarded a prize from the European Community because of its innovative institutional features. Over the first years of its operation, CADA not only owned the Nove facility but it was also entirely responsible for its daily running. Initially, the artisans involved in the consortium displayed a great deal of **enthusiasm**: the facility not only solved their pollution problems but it also constituted the first and **tangible outcome of a collaborative process** at the local level. As a result, the general meetings of the members were well attended and it proved remarkably easy to identify motivated artisans to join the managing board of CADA. By the early 1990s, the enthusiasm was enhanced by rapidly falling water processing as the facility was increasingly used to process 'external' effluent waters (i.e. from non-members). Unfortunately the move proved to be unsustainable because the facility was accepting water which could not be adequately processed thus discharging toxic gaseous compounds<sup>9</sup>. Public unrest about the facility mounted and a legal action was undertaken against CADA. For a short time the facility

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<sup>8</sup> *Ex post* it is quite clear that this compromise led to the definition of project which was significantly under-scaled with respect to the optimal scale of operation of a waste management facility. In the mid-1980s, however, experience with operating such kind of facilities was relatively under-developed. As a result, it proved still possible to convince the public counterpart (the Province of Vicenza and the Region) to endorse its realisation and to provide the necessary authorisations

<sup>9</sup> It must be stressed that this event was largely unexpected even to the environment experts of the artisan association. In principle, the Nove facility had been planned so that it could process a broad

was shut and its president (an automobile repairman from Bassano del Grappa) was even taken to court.

While the ensuing legal case had luckily very mild consequences for CADA (which was found to be liable only for negligence), it clearly constituted the watershed in its life. From this time onwards, management of the facility was tendered out to a professional agency and the extent of the artisans' participation to the life of the consortium died off. Furthermore the late 1990s witnessed the emergence of numerous private waste management facilities in the area. While CADA doubtlessly acted as a template for such initiatives<sup>10</sup> it is however proving unable to profit from its longer history because of its relatively small scale. Larger plants can nowadays accommodate multiple processing lines and they therefore enjoy significantly lower unit costs.

#### 4 THE EXPERIENCE OF FIC IN ARZIGNANO

This effluent treatment plant is located within the leather-manufacturing industrial district of Arzignano. The plant is owned by the FIC (Fognature Industriali e Civili<sup>11</sup>) **consortium** whose members are the six township administrations of the Chiampo Valley<sup>12</sup>. The consortium was created in 1973. Recently a discussion has been started among its members to turn it into a share-holding company with greater private participation in the managing board. The facility occupies an area of over 120,000 m<sup>2</sup> at the outskirts of the village of Montorso and it accommodates two processing lines: a chemical line to handle the toxic chemical compounds from

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range of water types (including those that were effectively discharged), even after it had been scaled down. Much to the surprise of the involved parties, the actual plant did not display such a feature.

<sup>10</sup> In the early 1980s, as the demand for some kind of support with water processing was emerging most visibly in the area, the artisan association (through one of its consultants) explored informally the opportunity of convincing private entrepreneurs to undertake such an activity. In fact, the association opted for an autonomous move and it turned to the regional government only when it was confronted by the scepticism displayed by the private sector. The main cause for such lack of enthusiasm certainly resided in the high uncertainty surrounding both the economic viability of water processing facilities and the willingness to pay of its potential clients. As both such problems lost much of their significance, private entrepreneurs did not fail to pick up a valid business opportunity.

<sup>11</sup> Industrial and Household Sewage

<sup>12</sup> The consortium was originally established (and therefore it only processed the water discharged by the producers) by three such townships, namely Arzignano, Chiampo and Montorso, namely the areas which are located downstream in the valley and which host the overwhelming majority of leather-processing firms. Since 1986, the townships of Altissimo, Crespadoro and San Pietro have also joined the consortium. Much of the water from such areas comes however from households and it therefore has a relatively minor impact upon the processing capacities of the plant.

industrial water<sup>13</sup> and a biological line to treat household as well as industrial water<sup>14</sup>. The plant generates daily 500 m<sup>3</sup> of mud which is stored locally and it is serviced by a network of over 35 km of pipes. The history of the FIC consortium is **best presented in two phases**. The first phase started in the late 1950s (as the unrest concerning excessive water pollution begun to mount within the valley) and it ranged until 1984 (when the plant was placed under custody by the local court). The second phases started in the mid-1980s and it ranged until the present days. While much of the investment for the plant was undertaken in the first phase, it was in the second one that FIC truly played its strategic and catalytic role in the district.

The growth of leather manufacturing in the industrial district of Arzignano was very rapid over much of the 1950s and it resulted in a spectacular increase in water pollution. At the time, agriculture was still a significant component of the local economy and the protests of the irrigation consortium of the valley still possessed a significant political weight. In order to reduce such **unrest**, the township of Arzignano had already put forward in 1961 the proposal for a new general-purpose sewage system. The plan was however denied the necessary permits by the regional government because of its technical deficiencies. The proposal of a dedicated processing plant was also nurtured and brought forward almost in entire autonomy by the local government with the similar purpose of reducing public unrest. A preliminary pilot study of the local rivers was initiated in 1967 and in 1971 the project for the Montorso treatment plant was finalised.

The scale of the project proved immediately beyond the means of the township and the FIC consortium (grouping 3 neighbouring townships) was therefore established. From an administrative point of view the transition had little significance since the leadership was retained by the Mayor of Arzignano. It however sanctioned a more **active participation by the private producers** of the district who were granted the right to nominate 50% of the consortium managing board. In exchange, they agreed to comply to the regulations put forward by the consortium as well as to bear 30% of the entire project cost. Over the second half of the 70s, the plant was realised at a cost of nearly 140 Lit. billion (in 1996 constant prices, equivalent to over 80 USD million). Around 60% of the entire investment was born through public grants available for such large-scale infrastructure investment. Private contributions amounted to little over 20%

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<sup>13</sup> The chemical line processes daily over 24,000 m<sup>3</sup> of water extracting more than 3,500 kilograms of sulphur compounds and little less than 2,500 kilograms of chrome.

<sup>14</sup> The biological line processes over 30,000 m<sup>3</sup> of water.

of the entire endeavour while the consortium itself (i.e. local government) contributed for the remaining 20%. The divergence between the initial decision and the private contributions effectively put forward is explained by the fact that the final lot of the project (realised between 1980 and 1983) was significantly larger than initially envisaged. By 1978, the first processing lines of the plant were inaugurated and industrial water started being processed. Over this period the treatment plant **failed to solve the pollution problem** but the protest from the farmers was kept under control by the promise of more effective treatment lines to be realised. In summer 1983, as the treatment plant was terminated, protest fiercely resumed and it peaked in March 1984 as the local court placed the plant under custody, effectively leading to a shut-down of leather manufacturing in the Chiampo valley. Faced with such a radical challenge, the local leather manufacturers had to choose whether to relocate production or to tackle its environmental impact more seriously.

The FIC consortium (certainly thanks to the dynamism and vision of its president) **played upon the latent fear** of the local leather manufacturers radically re-designing its role within the district and earning broader managerial legitimacy in the local economy. Apparently, the sole **policy instrument** used to achieve such a result was a rapid increase in the price of processing effluent water characterised by a higher than average concentration of pollutants. This move convinced the local enterprises either to adopt adequate technology to process the toxic compounds (such as the creation of in-house recycling facilities) or, alternatively, to shift to production technologies which made a less intensive use of these compounds. The impact of such a move was that, within a relatively short period of time, the level of pollution was cut down to a sustainable level.

At a closer scrutiny, the **enforcement** of the policies identified by the consortium was not quite as simple as it might appear. The reader needs to be reminded that the local entrepreneurs continued exercising a great deal of control upon the consortium and its pricing policies for much of the Eighties<sup>15</sup>. The FIC president had therefore little hope to implement 'painful' rate increases without a sufficiently large

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<sup>15</sup> In late 1986, the regional government passed a law prohibiting private participation to the management board of public institutions dealing in waste management. As a result, the peculiar institutional set-up which characterised the FIC consortium had to be abandoned from 1987 onwards. The reader needs to be reminded, however, that the Arzignano entrepreneurs (once again under the leadership of Trevisan who had however abandoned its position as Mayor of Arzignano) largely regained much of such control after 1991 as they collectively (i.e. through an enterprise called Intesa of which they were all share-holders) won the tender to run the facility at Montorso.

consensus within the managing board. In such a task he was certainly supported by the continuing pressure placed upon the consortium by the public opinion and by the local courts. An element which needs however to be emphasised is that the entrepreneurs sitting on the board of the consortium were given the opportunity to learn how their individual (and otherwise largely un-coordinated) decisions had a cumulative impact upon the local environments and therefore they gained **collective responsibility** vis-à-vis the public opinion.

The establishment of a consensus within the managing board appears as a necessary but not sufficient element behind the reduction of water pollution. The consortium also played a key role a) in identifying the technology required to reduce the environmental impact of leather-manufacturing and b) in providing further economic incentives to implement such technology. Both such features emerge visibly from an account of how the problem of excessive water salinity was tackled after 1985<sup>16</sup>. As water de-salinisation at the Montorso facility appeared from the start excessively expensive, FIC embarked upon the search for alternative technological solution to help the leather manufacturers to “separate” untreated skins from salt. Thanks to the presence within the area of numerous machine manufacturers, numerous solutions were tested and the most effective technology rapidly emerged. The consortium did not, however, stop at this level. It also identified a) a potential purchaser for the salt thus accumulated within the producers’ premises, b) the site to store the staggering amounts of salt building up daily in the district and c) the means to collect and transport it. After a short time, it emerged that salt re-cycling was a promising business area and the entire service was spun off to a private firm.

At a closer scrutiny, the consortium does not appear to have played a ‘dirigist’ role but rather to have **catalysed the establishment of a consensus** within the district. Such a role was gained thanks to the dedication, vision, and liaison capacities of the president of FIC and to the public pressure constantly exercised upon such an institution. It would however be incorrect to believe that such a mechanism was easily replicated under all circumstances. In the early 1990s, as the most pressing environmental emergencies were being addressed, the consortium attempted to tackle a more latent (but potentially very explosive) issue, namely that of odour. The problem

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<sup>16</sup> Untreated leather is commonly stored under salt to reduce its humidity and therefore to prevent its maceration. Traditionally, such salt had to be washed away from the skins prior to their treatment and therefore it all ended up dissolved in the effluent water. Excessive water salinity proved to be one of the target of farmers’ unrest as it made the Chiampo river unsuitable for irrigation purposes.

could not be solved through the expensive re-design of the sewage network<sup>17</sup> so that FIC put forward an innovative in-house re-cycling scheme. In principle, the consortium would collect the recycled compounds (through a lorry service), and dispose of them within the treatment plant at Montorso. A largely unexpected consequence of such a scheme was however that FIC could monitor its clients' leather production to an extent that was previously impossible. The fear that such confidential data could become public (and therefore available to competitors as well as to all public institution) spread among the local producers and it effectively brought the project to a sudden stop.

## 5 A COMPARISON OF THE TWO INITIATIVES

Clear similarities emerge from a comparison of the history of the two effluent treatment plants. An initial caveat is however in order and the reader needs to be reminded that the Arzignano facility is not only significantly larger than its counterpart in Nove but it is also technically different in the sense that the sewage pipeline network operated by FIC is entirely missing in Nove. As a result of these two features, the Montorso plant is significantly better sheltered from private competition than the one owned by CADA. In the late 90s, as the eco-business is growing larger and more competitive, such difference is gaining greater importance and it is pressurising CADA much more than FIC.

For a start, it appears that the **pressure directly exercised by public opinion** as a result of their concern with increasing pollution is neither a necessary nor a sufficient element to trigger a collective response within an SME cluster. In the case of Nove, there is remarkably little evidence of public unrest and protest (surely related to the relatively minimal environmental impact of artisan production). In the case of Arzignano, the public opinion could be kept under control for more than a decade a) because of the importance of the "polluting" industry within the local economy and b) because of the tendency of the local policy makers to trust the promises of the producers themselves or of their representatives (concerning their determination to solve the problem through long-term projects). Quite on the contrary, the largely

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<sup>17</sup> From a technical point of view, the solution consists of splitting up the network for the acid compounds (used for leather processing) and for the basic ones (used to wash up untreated skins). Such a technical solution is relatively inexpensive if it is implemented from the very beginning and therefore introduced at the planning stage in the definition of the industrial water network. It proves to be prohibitively expensive if such network is already in place, as in the case of Arzignano.

**autonomous role of the courts and of the environment protection agency** (enforcing environment protection legislation) acted as the “external” trigger which turned a latent issue into a pressing problem for the *individual* enterprises.

The transformation of the problems experienced by the *individual* entrepreneurs into a *collective* challenge to the local industry was in both districts the result of a further element, namely **the lack of viable solutions within the reach of the entrepreneurs**. The lack of in-house water treatment facilities which were suited to the needs of SMEs has already been emphasised in section 3 and 4. The case of Nove also testifies to the initial reluctance of the private sector to enter into the water treatment business. Such reluctance was the outcome of the severe uncertainty surrounding not only the viability of the technological solutions but also the capacity of the polluting enterprises to undertake the necessary internal restructuring as to reduce the toxicity of their processes. In both cases, however, awareness concerning the challenge collectively faced was achieved only as a result of **the direct involvement of the local institutions** (the artisans’ association in the case of CADA and the township administration in the case of FIC). Such an affinity needs to be related to the significant costs to be borne to put forward credible policies to address the problem.

A further similarity between the two case studies is the tendency to start the collective response with a markedly political initiative essentially aimed at **buying time**. Time is required a) to build up a consensus over the most suitable long-term strategy among the members of the consortium (including the need to bear part of the necessary investment), b) to win the pledge for much-needed public grants, and c) to identify a suitable site for the recycling plant. The opportunity open to CADA to purchase treatment capacities from external providers was related to its initially low number of associates and to the modest environmental impact of their productive activities. Such an option was therefore not available to FIC.

After the realisation of the treatment plant, the fate of FIC and that of CADA followed markedly different paths. While FIC earned itself a central role triggering structural change within the cluster, such an option was not offered to CADA as the artisans’ association of Vicenza envisaged the consortium as an instrument to broaden the provision of services to its members rather than as the forum to build a new type of partnership with such entrepreneurs. Section 4 already emphasised that broadening the mission of FIC cannot be envisaged as an act of dirigisme by its president but

rather as the outcome of his efforts to build up an adequate consensus within the managing board. More to the point, FIC emerged as the centre of 'district-wide governance' because 1) it facilitated the perception of a district-wide problem, 2) it enabled the local producers to relate collective challenges to their individual ways of doing business, 3) it provided the incentive for the local machinery producers to further customise their technologies, 4) it dispersed 'best practices' within the district, 5) it pioneered innovative entrepreneurial activities (until private providers stepped in), and 6) it liaised with the local policy-makers and with the public opinion.

In the last analysis there is no doubt that both CADA and FIC acted as valuable **templates** within their districts. For sure, their financial viability displayed to a range of local entrepreneurs the profitability of **customising** waste processing plants to the needs of SMEs. A further facilitating element is that the promotional initiatives undertaken by both consortia in the early 1980s gave rise to much greater environmental awareness within the districts which could subsequently be seized upon by private operators. In this sense, the two consortia acted as important **path-breakers**. Evidence concerning institutional impact is much less clear-cut. Surely, the two consortia did not share a similar fate. CADA was sponsored by an institution 'external' to the district (the provincial branch of the artisans' association). *At a cluster level* it did not have any major institutional impact. In terms of the capacity of the *artisans' association* to better respond to the needs of its members, it certainly confirmed the viability of a *modus operandi* which had however already been amply tested (through export and credit consortia). FIC has been on the contrary the first case of a public-private partnership in Arzignano. Attempts to broaden its mission were initially largely successful (as when it became involved in selling chemical compounds recycled from processed water) but they were then rocked by the resistance of the district producers (the failure of the odour-abatement project has already been described). However, attempts to revive the partnership (as in the case of the project to create a service centre for the leather industry) never won the support of the district producer.

## 6 CONCLUSION

The comparison of the two institutional initiatives described in the paper discloses some interesting lessons for SME clusters in developing countries. By far the

most valuable insight is that waste treatment facilities are **ideal targets for a collective action** within clusters. Their significant cost and indivisibility imply that addressing the problem of environmental impact is well beyond the means of the individual entrepreneur. Such collective involvement is equally needed in order to effectively confront the public opinion and the local policy makers: the creation of a consortium and even more the commitment of private financial resources represent the price to be paid to earn public recognition and legitimacy. The importance of such legitimacy in earning much needed time should not be underscored.

Collective action never appears to be the result of the sum of individual problems: a **catalytic event** is in other words needed to transform a group of autonomous and competing entrepreneurs into a constituency within which cooperation can be established. Such event is invariably related to the bottom line of the enterprise. In the two case studies reported, public pressure was found to be neither a necessary nor sufficient pre-condition, while fines were. When fines were levied, the financial viability of the majority of the cluster enterprises was immediately challenged. Such **challenge** constituted the common element which pushed individual entrepreneurs to realise the similarity among their fates. It needs however to be mentioned that the strategy of dodging the legislation may remain within the horizon of many SME owner. The value of the two institutional solutions described in this paper resides in the fact that this second option was effectively ruled out as a result of the provision to the entrepreneurs of an **affordable solution** to their problems.

The cost of realising a waste treatment plant appears as a formidable obstacle to a collective action within the cluster. **Start up costs** are high a) because of public resistance against the localisation of the treatment and storage facilities, b) because of the infrastructural investment, c) because of the structural adjustment that the firms invariably need to undertake to “standardise” the characteristics of their effluents. Relatively to point a) it seems that the capacities of the clusters producers as a *group* are insufficient and they need to be supported by a public initiative. With respect to point c) investment by the *individual* entrepreneurs appear on the contrary as the most adequate measure for them to “bind” themselves to the project and to demonstrate their own motivations. Public support therefore appears necessary with respect to point a) and wholly counterproductive with respect to point c). **The distribution of the infrastructural costs** therefore appears as a key determinant of the success of the entire collective action. Over-reliance upon private funding can put the achievement of

an optimal scale plant in serious jeopardy with deep consequences upon its long term viability. Over-reliance upon public funding marginalises the producers and it reduces their incentive to participate in the decisions of the managing board.

In a cluster characterised by a relatively poor institutional environment, the implementation of a valid solution to the environmental challenge appears as a formidable source of legitimisation for the agency which successfully collaborates with the group of producers. The initiative has therefore the opportunity to broaden its mission and to become the **centre of cluster-wide strategic decision-taking and the engine for structural change**. The need to retain private participation to the initiative should discourage a 'dirigist' approach. Preference should therefore be granted to consensus-strengthening strategies. The last point that needs to be emphasised is that successfully tackling an environmental challenge is a necessary but not a sufficient ingredient of the attempt to enrich the institutional environment of the cluster, as abundantly indicated by the experience of FIC.