

Conceiving Comparative Policy Analysis

Implementation of Air Quality Improvement Programs

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Abstract

The comparative analysis of air quality control policies provides an interesting field for studies of comparative policy analysis including program formulation and implementation processes. In European countries, the problem is comparable, whereas implementation structures, programs and policy impacts vary to a considerable extent. Analysis testing possibilities and constraints of air control policies under varying conditions are likely to contribute to a further development of a theory of policy analysis. This paper presents the analytical framework applied in a continuing empirical study explaining program formulation and implementation processes with respect to the different actors involved. Concrete emitter behavior can be explained by interaction processes at the very local level, by program elements of national legislation, and by structural constraints under which such programs are produced.

Résumé

L'analyse comparative des politiques de contrôle de la qualité de l'air ouvre un nouveau champ d'analyse qui comprend la formulation de programmes et les processus de mise en œuvre. En Europe, la situation est comparable d'un pays à l'autre, tandis que les structures pour la mise en œuvre, les impacts des programmes et de la politique varient considérablement. Les possibilités de tester l'analyse et les contraintes des politiques de contrôle de l'air dans des conditions variables contribuent au développement ultérieur de la théorie de l'analyse des politiques. L'article présente le cadre d'analyse d'une recherche empirique encore en cours: il explique à la fois la formulation des programmes et les processus de mise en œuvre à la lumière de leur sélectivité qui favorise ou défavorise les acteurs qui sont impliqués. Le comportement concret d'émission est expliqué par des processus d'interaction à un niveau très local, des éléments de programme des législations nationales ainsi que des contraintes structurales par lesquelles ces programmes sont produits.

1. Introduction¹

In most Western European countries systematic air quality control policies were introduced in the early seventies; hitherto mostly very general parliamentary acts were concretized by administrative decrees or guidelines. During the first half of the decade air quality improved rapidly; after the oil crisis of 1973/74, however, ambient air quality measurement data showed a considerable degree of stabilization; towards the end of the seventies, signs of deterioration in most metropolitan areas and – more significant – in middle range subcenters were evident. A comparison of these data with air quality control legislation leads to the conviction that the programmatic promises of the early seventies have not been realized everywhere to the same extent². Social science research interested in an improvement of the implementation of air quality control programs has to ask for the possible *reasons* for such *different impacts* of environmental policies in different regions and countries. Implementation activities are normally carried out by regional agencies. In most European countries these agencies can be considered as the core implementation actors. They work in cooperation with local authorities and under some form of (more or less close) supervision by different national agencies.

Referring to classical implementation theory (e.g. Pressman & Wildavsky, 1973; Gross, Giacquinta & Bernstein, 1971), we assumed that the quality of implementation activities especially depends on the structure of the national and/or regional *program* itself, specific features of the *implementing administrative units* and on the *constellation of actors* within their jurisdiction (implementation field). In order to control the influence of these three variables two to four different local implementation areas (LIA) have been chosen within selected regions (regional implementation system = RIS) keeping the precisely defined emitter structure as constant as possible. This selection makes it possible to *compare* activities of different implementation systems both within a given country and between the different countries under investigation.

The “International Comparative Analysis of Program Formulation and Implementation of SO₂ Control Policies in Seven EC Countries and Switzerland”³ presented here examines the management of air quality (SO₂)

¹ This contribution is based on “Analytical Framework and Research Guidelines for the National Research Teams” by Peter Knoepfel, Helmut Weidner and Kenneth Hanf. It also includes some research notes written in connection with the International Comparative Analysis of Program Formulation and Implementation in SO₂ Air Pollution Control Policies in EC Countries and Switzerland, a research project of IIES, mutually funded by the German Research Foundation and Foundation Volkswagenwerk. It is a shortened and modified version of my contribution to the Colloquium at Lausanne. I would like to thank Dagmar Kollande, IIES, for some valuable suggestions in editing this article.

² Such differences can be found in the FRG (Munich vs. Berlin), U.K. (Greater London vs. Liverpool), France (Paris vs. Lille), Italy (Rome, Bologna vs. Turin). Cf. Knoepfel & Weidner, 1980, 27.

³ Cf. P. Knoepfel; H. Weidner & K. Hanf: “Analytical Framework and Research Guidelines for the National Research Teams” (Manuscript, Berlin, June 1980). This project is mutually funded by the German Research Foundation and the Foundation Volkswagenwerk.

over the last ten years; it attempts to find out the most important factors responsible for the improvement or deterioration of ambient air quality in comparable areas (LIAs) by specifically analyzing activities of environmental agencies using a *common framework*, which would make it possible to compare different policies within different various countries. Referring both to the German "polit-economic theory" (e.g. Harbermas, 1973; Offe, 1973; Knoepfel & Weidner, 1978) and some American analysts (Bardach, 1977; Downing & Brady, 1978; van Meter & van Horn, 1975; Downing, 1979), environmental quality policy can be considered as a "policy game" in which interest-motivated actors participate by employing different strategies on different levels. Policy outputs such as implementation activities and programs are seen as results of interaction processes amongst actors under predetermined constraints set by the rules of the game. Using this analytical concept, it is necessary to include in implementation analysis an assessment of interest recognition patterns within the program formulation process itself. Specific actors frequently play a multiple game, acting at the same time on both the local implementation and the national program formulation levels. Furthermore, implementation analysis must include those policy processes in which specific constraints of interaction processes as such are created and modified. Actors may seek to change these rules of the game in order to secure their interests in any concrete case.

The ultimate dependent variable of such an analysis is the *trend of air quality* in the selected local implementation areas as indicated by measurement data. In European countries, climatic and topographic conditions can be treated as constant factors as well as the transboundary SO₂ imports over ten years which partially influence these quality trends (Barnes & Met, 1978). Therefore, our secondary dependent variable is the actual development of SO₂ emissions shaped by the *behavior of the main emitters* within a given LIA immediately affecting air quality in that area. On the basis of SO₂ emission data we attempted to determine the extent to which emitter behavior depends on implementation activities of environmental agencies. It is obviously not shaped exclusively by environmental policy activities. On the contrary, there are important "intervening variables" affecting emission activities although not directly related to environmental policy. As in the case of locational and even sociostructural variables, it is necessary to include the main intervening variables in the analysis. Nevertheless, some reduced correlation between environmental implementation activities (indicated primarily by administrative outputs) and emitter behavior has been found. On the basis of comprehensive output analysis our research investigated all *interaction processes* between agencies, individual emitters and any other actors leading to related outputs. Assuming that these interaction processes are partially determined by different kinds of programmatic constraints, and by the relative power of involved actor groups and emitters, the project tried to identify the weight of these different elements determining specific *interest recognition patterns* found in the individual LIAs. For that purpose the empirical analysis proceeded from

the bottom (LIA) to the top (national program formulation) in order to reconstruct crucial elements of the relevant environmental policy game.

This article tries to reassume the basic elements of our framework and to outline the crucial analytical dimensions developed for the empirical investigations realized by national research teams in cooperation with the central team in Berlin⁴. It is not intended to report on the results of the investigations although they are available at the moment. Their considerable quality, however, shows that by using this conceptual framework it is possible trace empirically crucial aspects of program formulation and implementation processes in regulative environmental policies in a comparative way⁵.

2. Conceptual framework

2.1. Overview

The starting point for the analysis *within each of the approximately 70 LIAs* from 20 Regional Implementation Systems in eight European countries lies in the changes of actual ambient air quality (outcome) to be related to changes in the behavior of relevant emitter groups over time (impact). Secondly, our research has tried systematically to identify the motivations of emitters to either change or maintain their behavior in order to determine the extent to which emitter behavior is influenced by environmental policy activities. Finally, our research has attempted to account successively for these policy impacts by examining the effects of different policy outputs on emission-relevant emitter behavior, the sets of interaction through which these outputs are generated, and the structure of national control programs conceived in a very broad sense. For that purpose, it was necessary to establish, from the very beginning, a broad analysis of actors on the national, regional and local levels. The sequence in which the following variables are presented corresponds to the various successive steps of the research.

The different groups of *independent variables* are presented as different *layers* of a complex set of interrelationships among actors on different levels, through which the *interest position* of these actors involved in program formulation and implementation processes are asserted. These interests are reflected at first in consolidated political-administrative structures and procedures themselves (rules of the game), in the specific contents and structures of concrete policy programs, and, in concrete interaction processes concerned with implementation. In order to prevent the danger of "top-down-perspectives" excluding important but programatically not anticipated processes, it was decided to begin with the analy-

⁴ Composed of Helmut Weidner, Kenneth Hanf and the author. The countries involved are: Italy, France, Federal Republic of Germany, Belgium, the Netherlands, U.K. and Switzerland.

⁵ A *reassumption of the final reports* will be made in the final comparative study established by Helmut Weidner and the author (vol. 2) in 1983. Furthermore, the national reports will serve as the basis for a book to be published in each country of the project in 1982 in the respective native languages.

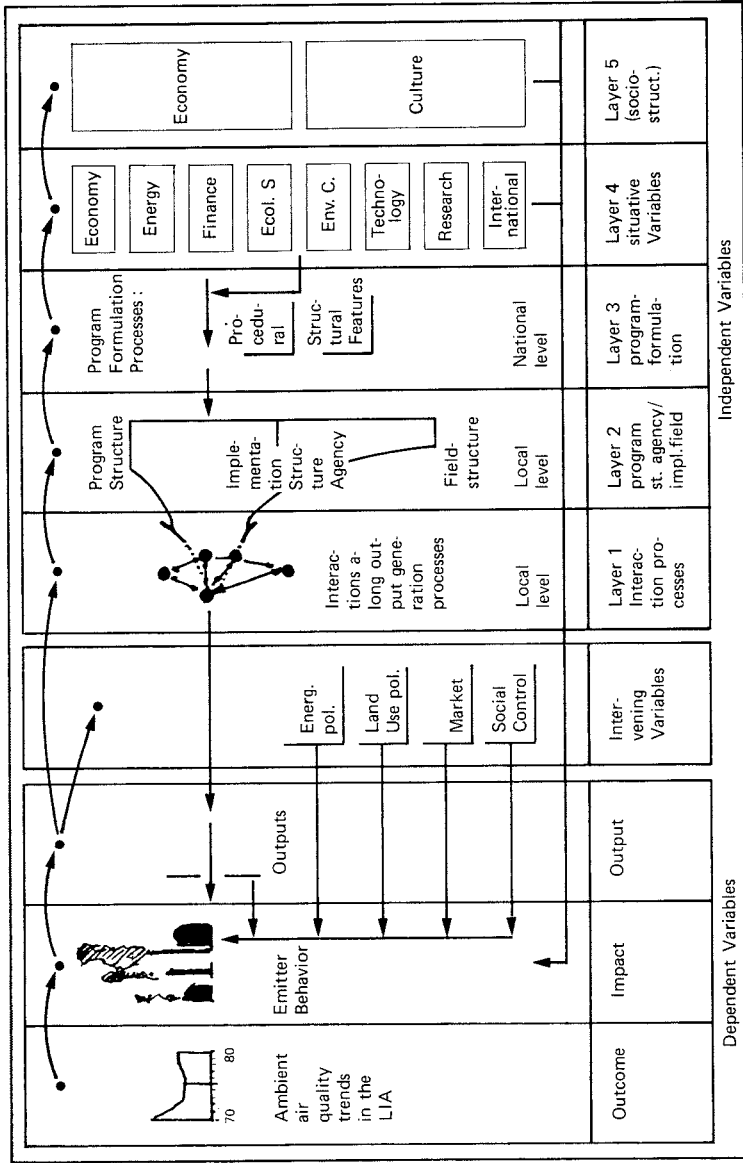


Fig. 1. International comparative analysis of program formulation and implementation of SO₂ control policies in seven EC countries and Switzerland. Schematic representation of the research design with respect to the different groups of variables.

sis of implementation activities in the different LIAs, then move back towards the examination of program formulation processes on the national level. The chart (Fig. 1) illustrates the research design with respect to the different groups of variables listed below.

2.1.1. Dependent variables:

- The actual level of SO₂ concentration in the ambient air and its change over time within each LIA (“outcome”);
- the actual behavior of the main emitter groups in the LIA and its change over time (“impact”);
- the environmental policy implementation activities which partially affect emitter behavior in each LIA (“outputs”).

2.1.2. Independent variables:

Layer 1: the *interaction process* between the environmental agency, emitters and local, regional or national actor groups involved in implementation activities through which outputs are generated, explaining their selectivity and their content.

Layer 2: The *relative power of actors* involved, the *administrative implementation structures* within the LIA and implementation-relevant *program elements*: the interaction process is viewed as the result of the actions of the various actor groups operating in the implementation area according to the rules of the game prestructuring certain patterns of interest recognition reflected in the administrative program, as well as the result of concrete administrative structures and possible interventions from “above”.

Layer 3: Structural and procedural features in *program formulation processes* on the national level: as an explanation of the pattern of interest recognition found in the implementation processes, program formulation processes are to be investigated in order to enable the explanation of resulting program elements.

Layer 4: *Locational variables*: such context dimensions changing over time may either positively or negatively affect the interest position and relative influence of actor groups in implementation and program formulation processes independent of concrete environmental policy issues.

Layer 5: *System-structural “variables”*: these basic societal power relations work constantly in favor or against the power positions of actors involved in program formulation and implementation processes independent of limited changes of locational variables over time.

2.1.3. Intervening variables:

- energy policy outputs and their background;
- regional planning outputs;
- macro- and regional economic policy outputs;
- market mechanisms;
- direct social control over emitters by the public.

2.2. *The dependent variables – determining the net effects of environmental policy*

Ambient air quality trends (outcome) are reported by measurement data available for all LIAs under investigation. This situation enables implementation and evaluation research in quite a unique way. The level of pollution and its changes over time can be considered as a direct function of the volume of *emissions* and its *dispersion* conditions (height of chimney stacks) by keeping constant climatic and topographic conditions as well as SO₂ imports into the area. Emitter behavior is indicated by the total volume of SO₂ per LIA; its changes over time combined with the related dispersion conditions calculated in terms of the average height of stacks for the different main emitter groups over time are investigated by means of individual interviews. A comparison of ambient air quality data with the total amount of SO₂ emissions and dispersion conditions has brought a direct correlation, at least for the early seventies, when almost everywhere in Europe the sulphur content of fuels was reduced.

Determining a linkage between *emitter behavior* and *environmental policy activities* has been more difficult. In order to estimate an approximate overall effect of policy activities a “net emission effect” of the development within the LIAs was calculated by estimating how the total volume of emissions would have developed since 1970, according to actual economic development if the kinds of fuel consumed, their sulphur content, the emission factors and the heights of stacks would have remained the same during the last years. The SO₂ amount calculated in this way has then been compared to the actual emissions of 1979. The difference between extrapolated and actual figures has been interpreted as the “net emission effect of development”. However, this figure cannot be considered as the net effect of environmental policy, since it largely reflects consequences of either measures in other policy areas, changing conditions on the fuel supply market, or developments in social control exerted by those affected by pollution (“intervening variables”).

In order to determine the actual *net effect of environmental policy* these factors have to be excluded. For this purpose, the different *motives* of the main emitters have been studied: their change of behavior by using alternative fuels, introducing new abatement technologies, closing down their plants or building new ones and changing their stacks. Having isolated emitter behavior owing to environmental policy outputs the research focused upon all relevant *output* files in environmental agencies in order to explain the behavior of industrial and domestic emitters by different policy activities. Outputs normally consist of permits for new plants, clean-up orders for existing plants, control activities, sanctions and enforcement activities. The comparison of actual emitter behavior, elicited by means of interviews with the outputs, served as a basis to estimate the degree to which emitters were in compliance with regulations and orders in the different LIAs. The net impact of environmental policy consists of those

cases in which emitter behavior can be considered to be in full compliance with the related set of administrative outputs⁶.

2.3. *The independent variables*

The empirical analysis of the data from Layers 1 and 2 of the matrix of independent variables has served to explain the different types of output activities in terms of the interest position, the modes of behavior and the *interaction* of the participating actor groups in the *prestructured policy implementation* game. Interaction processes have been described with respect to the number and constituency of participating actors, the characteristic features of the content of the output, the actual features of the administrative procedure and its duration, the coalitions among the actors, the possible involvement of national and regional actors and changes of the content during the implementation processes. On the basis of these data the extent to which the outputs can be related to *particular actors' interest* was determined by examining not only the concrete procedural influence variables assumed to be significant but also the variables of the administrative and political structure in terms of their interest selectivity. Such administrative structures include routine procedures often legally formalized, administrative organization such as the distribution of competences, equipment, staffing, financial resources, the degree of autonomy of different administrative units and their leeways of discretion. From this perspective, however, there remained a more or less significant portion that could only be explained in terms of implementation-relevant elements of the national administrative *program* as described under 3.5. below (Layer 3). Thus, already *prestructured elements determining implementation interaction processes* became the object of the analysis of program-formulation-oriented interaction processes on the national level. Such processes, too, occur under particular structural constraints such as the distribution of competences amongst ministries, the involvement of other administrative units or the employment of external experts and commissions. These administrative organizational patterns can also be explained frequently in terms of the interest position of the main actors.

According to the framework locational variables are considered as specific socio-cultural, socio-economic and political *context dimensions* within which environmental policy processes take place. These variables have an impact on program formulation and implementation activities; they influence the opportunities for action and the interest position of the various actors within the stable, basic patterns of societal power

⁶ As noted below (3.4.1.), under specific political-administrative cultures such as in the case of Switzerland, we can find compliance without any concrete individual policy output due to an involvement of emitters in a well-established interaction network between emitters and the related agency. In some other cases we find direct compliance with general regulations without individual outputs.

relationships set by the system-structural conditions. The following eight variables have been analyzed :

- (1) economic situation ;
- (2) energy situation ;
- (3) governmental finances ;
- (4) ecological situation ;
- (5) environmental consciousness ;
- (6) technological development ;
- (7) level of environmental research ;
- (8) international influence .

When conceiving and analyzing these variables empirically over time, the research did not intend to explain ambient air quality changes or different types of emitter behavior by immediately correlating them with each other. Rather, they served as *secondary explanation dimensions* supporting empirically evident constellations. Primarily, changes of the economic situation and energy supply in the 1970 's gave some additional explanations for the relative influence of powerful actors going beyond the data gathered in connection with the intervening variables.

Contrarily to liberal pluralistic theories of society, the project conceives the fundamental importance of the *structural principles* of national characteristics of *capitalism* and *political administrative culture* for the patterns of social interaction. Inequality of life chances, differences in perceptions, opportunities for action and the way in which social factors assert themselves will be decisively conditioned by the principles of the economic structure and cultural traditions. Patterns of inequality will be systematically and persistently reinforced by certain rules of selectivity which tend to function in support of specific capitalistic forms of societal organization. It has been assumed that there are *systematic limits to constraints* on the effectiveness of policies trying to improve environmental quality. These constraints are not always directly visible in concrete decision processes. They set very firm limits to reform efforts, especially in those cases where these structures themselves are to be modified. The question "To what extent are political administrative systems able to achieve a balance between the functional requirements of the economic system and legitimacy demands under these structural constraints?" will always be difficult to answer. Our limited analysis concentrated on data reported in existing literature on the following themes: power structures; the distribution of property rights; the degree of social control in the field of investment decisions (especially as far as relevant environmental activities are concerned); characteristics of social control over state-owned industries (energy sector, other infrastructural supply); the impact of unions' participation and of consumers on the relevant decisions. In the field of administrative-political culture, the reports by national teams focus on those characteristics of interaction patterns between the political-administrative system and its environment (which are typical not only for

the investigated policy area but typical for administrative activities of each country as a whole because of a common administrative political tradition).

2.4. The "intervening variables"

Analyzing intervening variables *prevents a "non liquet"* ensuring that we know at least something about the determinants of emitter behaviour if environmental policy outputs should not matter significantly. The following "other policy outputs" have been conceived as intervening variables:

- *Energy policy*: such outputs frequently consist of local or regional attempts to save energy and are implemented either by subsidies or tax advantages or by special conditions within building permits (hooking up to a district heating system, energy-saving equipment, insulating houses, etc.);

- *Land use planning*: only the Netherlands and Denmark have systematically coupled air quality control policies with land use planning (environmental impact statements in designated special industrial zones). For the other countries, local zoning, regional land use planning, or issuing building permits for industrial sites have been viewed as an intervening output either supporting or conflicting with environmental policy activities;

- *Regional economic policy*: financial subsidies or tax advantages can be granted to firms if moving into particular regions and complying with certain environmental conditions. More frequently, however, regional development policies do not care about environmental concerns. This situation often leads to conflictual policy outputs.

Emitter behavior often depends on *extra-governmental* socio-economic factors rather than on political-administrative activities. Such intervening variables often reflect changes in situational variables (such as economic and energy situations) as well as environmental consciousness:

- *Market mechanisms*: The development of energy prices, especially of electricity and natural gas, and their relative differences are likely to be responsible for emission-relevant changes of fuels. Utilizing "environmentally friendly" combustion technologies or air pollution control devices reducing emission depends on whether such technologies are economically feasible and profitable for the owner. Furthermore, industrial emissions often depend immediately on the degree of their productivity activities, which, in turn, depend on the economic trends.

- *Social control*: Formal agencies' enforcement activities are often stimulated by public pressure. Emitters comply with permit conditions or clean-up orders because they are concerned about their reputation. This kind of social control depends on the level of environmental consciousness in the local population. There are cases where environmentalists and emitters came to some "extra-governmental" contractual agreement regarding the regulation of local pollution problems.

3. Basic Analytical Dimensions

3.1. *Emitters – Emitter Behavior*

As emitter behavior is the secondary dependent variable indicating impact of air quality policies, the project does not consider emitters as simple actors but as *acting and reacting targets* of policy outputs. Except for the domestic sector, emitters are individual enterprises normally having strong relationships to the actor “industrial interest groups” being, by definition, involved in implementation and enforcement activities. Given their central role for implementation research, it was necessary first of all to establish an *inventory* of emitters by means of a common classification⁷, enabling the definition of the main emitters, to calculate the development of their SO₂ emissions as well as to typify the different patterns of interaction between emitter categories and agencies. For each LIA a relatively reduced sample of large emitters was found, especially power plants, refineries, iron and steel plants, chemical plants or collective heating installations, normally responsible for more than two thirds of the total SO₂ emissions. Emission-relevant behavior is indicated by the sulphur content of combusted fuels, the combustion technology and abatement equipment as well as height of stacks. By means of interviews with the most important emitters their *behavior* was described in terms of these three categories as well as their *motives* for changing or maintaining their emission activities.

3.2. *The actors*

3.2.1. The eight actor classes

The framework conceptualizes *eight actor classes* containing various actor groups acting under different labels depending on changing problem constellations and activity levels of the political system (local, regional, national). This conceptualization of actors implies at least loose, sometimes even partially conflictual, *contacts* between the different groups belonging to the same actor class because of the existence of a *common interest* rooted in their association with the same subsystem of society. The framework conceptualizes the following actor classes: (1) the environmental policy administration; (2) administrative units from other policy areas; (3) parliamentary bodies; (4) courts; (5) economic interest groups; (6) individuals affected by pollution and environmentalist organizations; (7) the scientific community; (8) political parties.

3.2.2. Analysis of the empirical actors

Using a heuristic model which reveals affected interests, the national teams went through all available lists of existing interest organizations in order to establish a comprehensive *table of all potential actors* in the field

⁷The classification contains the following groups: (1) coal-fired power plants; (2) oil-fired power plants; (3) refineries; (4) iron and steel plants; (5) chemical plants; (6) other large emitters; (7) commercial industrial plants with high energy consumption; (8) commercial industrial plants of medium size; (9) small commercial enterprises; (10) domestic heating installations; (11) transportation.

of SO₂ air quality control policies according to the eight-class typology. This way of starting the actor analysis has been very useful: firstly, it enabled us to find out the basic *network* of interest groups *behind* concrete policy processes and their investigation, bringing also up those actors playing a hidden role in prestructuring and organizing interventions by interests groups without appearing in concrete policy processes. Secondly, such networks turned out to play *equifunctional roles* in policy processes, especially by developing their own control programs, standards and other guidelines implemented by autonomous activities of the participants⁸. Another advantage of this table was the identification of those actors *actually involved* in policy processes. By using this network some unforeseeable actors can be detected as “grey eminences” which have not been discovered only by looking at documents describing concrete policy processes under investigation.

Furthermore, the comparison of potentially and actually involved actors served as an empirical basis to determine some *selectivity patterns* within policy processes.

In order to prepare the analysis of program formulation and implementation processes and to evaluate their relative power, the *main actor groups* have been analyzed *in detail*. The common framework especially stressed their internal structure and main activities; their external structures, such as coalition partners and memberships in governmental policy bodies, as well as their strategies in program formulation and implementation processes. Although primarily established for the explanation of actor constellations in SO₂ air quality control policies, this analysis has revealed some interesting aspects of the structure of interest representation in environmental politics. Therefore, it can also be applied to make anticipatory statements on the reaction of actors to new policies in other environmental areas.

3.2.3. Analyzing Environmental Agencies

The scope of comprehensive empirical analysis of the core actor, the “environmental agency”, was the definition of its degree of *autonomy and discretion*, its *problem solving capacity* and its *basic strategic orientations* over time. The degree of autonomy of the agency within a broader arrangement of different administrative units has been shown to depend on the formal hierarchical structure, normally only mobilized in conflictual cases, and on the relative power of an agency and its constituency within the institutional arrangement. In dealing with everyday issues, the autonomy of an agency is normally very high. Concerning the regional and local authorities leeway of discretion with reference to national supervisory agencies, the national research teams have established precise analyses of both the quantity and quality of “agency-oriented outputs”. Problem perception

⁸Private standard setting institutions can be found in Italy (ENEL for stack height formulas for power plants), France (CITEPA for monitoring and AFNOR), West Germany (Verein Deutscher Ingenieure – VDI for special air quality standards and stack height formulas) as well as Switzerland (fire insurances for domestic heating installations).

and problem solving capacity have been assumed to depend on the professional training of officials (technical *vs.* administrative skill), different career patterns, personnel and financial resources and the existence of analytical capacities of laboratories. In order to assess the *problem solving capacity* in a comparative way, the framework proposes to create an indicator called "*administrative sensitivity*". This indicator is established by analyzing the national budget over a ten-year period in order to estimate the percentage of environmental protection expenses within the whole budget and to define the percentage of expenses for air quality control such as research, instrumental equipment, financial means, and staffing. The increase of these costs has been related to the increase of SO₂ emissions within the country over time. In order to compare problem solving capacity among implementation agencies we established a similar index for "*implementation sensitivity*" within the LIAs under investigation taking into account the costs for staffing regional agencies, funds transferred from the national level for specific tasks, investments for research activities, and the costs for the creation of monitoring networks. The crucial comparative question was whether one could find at least a loose correlation between different levels of administration and related ambient air quality or emission trends amongst LIAs and countries.

On the basis of our comprehension output analysis and additional interviews with agencies the research tried to find different profiles of the *basic strategical orientations* of agencies (Dente, Knoepfel & Weidner, 1982). The agencies are typified along the following dimensions: case-by-case intervention *vs.* systematical selectivity in controlling emitters and giving clean-up orders; highly formalized intervening procedures *vs.* informal interaction processes; emission orientation *vs.* ambient-air-quality-oriented interventions. This topology will serve as the basis for the development of different types of administrative rationalities within air quality control policies amongst regions and countries.

3.3. The outputs

3.3.1. Overview

The framework distinguishes *three types* of outputs:

- *emitter-oriented outputs* consisting of permits for individual plants clean-up orders, monitoring/inspection processes and enforcement activities;
- *agency-oriented outputs* consisting of specific guidelines from supervisory agencies for regional and/or local agencies;
- *administrative programs* containing decisions on objectives, strategies, different types of standards, monitoring systems, financial, organizational and procedural decisions regarding implementation processes.

A precise quantitative analysis of the agency implementation outputs within the different LIAs brought up a handy comparative indicator for the agencies' activity level and its changes over time to be compared with

indicators of problem pressure. Moreover, the distribution of clean-up orders, inspections and enforcement activities amongst different emitter groups allowed to define some patterns of space or branch specific *selectivity*. A qualitative analysis led to different types of interest recognition patterns within interaction processes in which outputs are produced.

3.3.2. Emitter-oriented outputs

These outputs have been quantitatively documented by *output inventories* established for each LIA. They show the total number of outputs and their distribution over the ten-year period for each output category (permits, clean-up orders, inspections, enforcement activities) per emitter group and agency. A cross-regional and/or cross-national comparison of these inventories has to consider the fact that there are implementation activities of agencies *not* leading to formal outputs although having a probable impact on emitter behavior. According to characteristics of the political-administrative culture within a region or a country, agencies preferring *informal bargaining* processes with emitters within a well-established, almost institutionalized, *interaction network* can be found. In such cases the creation and maintenance of that network may be perceived as one of the predominant activities of the agency. The *qualitative analysis* of the outputs by means of a standardized form documented the control dimensions in the content of outputs, the formal and actual procedure of output generation, the different actor groups involved in specific steps of bargaining processes during the output generation, reasons, forms, frequency, intensity and consequences of their involvement. These dimensions are considered to be important for the reconstruction of different interaction patterns within different types of bargaining processes (Hanf, 1981). The analysis paid special attention to the participants (bilateral, multilateral) and informal preconsultation procedures leading to an agreement between agency and emitter likely to object to arguments brought up by environmentalist movements during subsequent public hearings.

3.3.3. Agency-oriented Outputs

Formal possibilities for the intervention of central authorities in concrete cases will depend on the broader constitutional arrangements of the country in question. The actual central/local relationship will depend on a number of political factors characterizing the case in question and its political importance. The range of such interaction patterns covers a continuum between a central government's jurisdiction and the regulatory activities of regional agencies without any involvement on the part of the central authority. Between these poles one can distinguish different forms of interaction according to the *degree of the central agency's involvement* and the source of *initiative* for the intervention.

Actual agency-oriented outputs intend to influence the overall *context* such as structures, processes, resources, etc., within which local or regional environmental policy implementation agencies operate. They contain realizations related to national regulations, supervisory and coordi-

native activities as well as allocational decisions (staffing, training of personnel, monitoring equipment, etc.). Contrary to agency-oriented outputs actual agency-oriented activities do not intend in any way to intervene in individual cases. They may be selectively setting *priorities* for specific problem areas which discriminate against regions considered less problematic.

3.4. Administrative Programs

3.4.1. Notion of "Program"

Contrary to other projects (e.g. Krupnick & Harrington, 1981), the framework of the presented study uses a *broad definition* of the term "program" (Knoepfel & Weidner, 1982). This definition is more realistic insofar as economic interest groups and parliamentary bodies in program formulation processes are often conscious of that broader notion: such an *ensemble* of different program elements may prestructure the implementation game to a much higher extent than traditional implementation policy analysts are supposed to assume. The concept of program contains the following elements:

(1) *Basic principles*: The extent of the "polluter-pays-principle", selection and extent of regulatory instruments, the degree of centralization/decentralization and standardization of regulation and the decision on an immission or emission orientation of control strategies.

(2) *Concrete policy objectives*: Stabilization of emissions or ambient air quality, their decrease or the control of their increase rates (Knoepfel & Weidner, 1980).

(3) *Strategy selection*: The framework distinguishes fourteen air quality control strategies with respect to stationary emission sources using the following criteria: immission *vs.* emission orientation and the objective of regulations (sulphur content; combustion and abatement technology; transmission) (Knoepfel & Weidner & Hanf, 1980).

(4) *Ambient air quality standards*: These are the main operational and evaluable control dimensions for the effectiveness of strategies and implementation activities.

(5) *Measurement methods*: Regulations on methods, data reporting as well as the installation of monitoring networks necessary for a reasonable implementation of the ambient air quality standards.

(6) *Emission standards*: Description of the maximal acceptable amount of discharged air pollutants with different methods (percentage, total amount).

(7) *Process standards*: They fix some minimal combustion or abatement equipment standards such as flue gas desulphurization equipment or the so-called "fluidized bed furnances".

(8) *Organizational and financial arrangements*: These elements predetermine the arrangement of implementation agencies, their jurisdiction and financial equipment as a precondition for any implementation of the program.

(9) *Administrative instruments and procedures*: Such regulations prestructure the degree of public involvement in implementation processes or the standing to sue against implementation agencies.

3.4.2. Programming implementation struggles – five typical strategies:

Given the fact that all these program elements collectively constitute the program and that changing one element means changing the program as a whole, the framework assumed that strategically skilled interest organizations would try to weaken programs by covertly building a pro-polluter bias into the rules of the implementation game without offending substantial program elements: They prefer to maintain a pro-environmentalist façade looking at the same time for possibilities to kill the program by objecting special technical issues with a rather hidden political content (Knoepfel & Weidner, 1982). Such strategies may be of the following types:

(1) *Ensuring favorable monitoring data*: It is possible to manipulate ambient air quality measurements by modifying the arrangements of single monitoring stations, of the percentage or time scale of standards or of the type of the chemical measurement methods.

(2) *“Democratization”*: The “democrats” argue that there should be a broader participation of local authorities in formulating principles for “their own” ambient air quality by using a case-by-case regulatory approach. Especially middle-range industry often favors this strategy arguing that those immediately affected by pollution and local authorities can appreciate the situation better. With this superficially “democratic” and “participatory” argumentation they cover their knowledge about their members’ stronger position in bargaining with local authorities (Ullmann, 1981).

(3) *Organizational arrangements*: Political scientists know that organizational arrangements can enormously shape the outputs of implementation processes (Bardach, 1977). In this field, the knowledge and experience of economic interest groups can be very high: having the best empirical experience amongst their members with the existing set of possible regional and/or local agencies able to cope with the program’s implementation, these organizations happen to propose organizational arrangements favoring their concerns. Hence, the arguments for one or another agency will always be quite “rational”.

(4) *Financial arrangements*: By voting against financial means for qualified staff of the implementation agencies or the construction of a reliable monitoring network in parliament, it is both possible to agree with strong standards on the one hand and to considerably weaken the implementation activities on the other.

(5) *Procedural arrangements*: In this field economic interest groups also seem to be the best political scientists: although public involvement in implementation processes as such has become a commonly accepted principle (Weidner & Knoepfel, 1981) there still remains a lot of

alternative ways of shaping concrete implementation processes more or less favorable to emitters' positions. For industrial plants in Italy, for instance, a procedural arrangement is so complicated that control activities hardly lead to any enforcement activity (Dente, Knoepfel & Weidner, 1982).

4. Conclusions

How can the results of the empirical research be evaluated? The comparative method of this project allows a comparison of the different LIAs and RISs and of the various countries under investigation, which uncovers evidence of positive and negative impacts of policy: emitter behavior may have been influenced in line with the national policy objectives or remain far from these programmatical statements. Such relative *variations in implementation activities and impacts* can, of course, already be built into the national and /or regional control program setting specific priorities. However, where the program suggests that all local administrative areas were to be treated equally, the research has tried to assess to what extent such differences in the implementation processes can be explained as the result of a too weak program structure of the varying activities on the part of the actor groups in the particular implementation areas, of varying administrative structures or of a conscious strategy pursued by the regional authority deliberately deviating from the national program. Usually such discrepancies between national program and regional implementation impacts are labelled as "*implementation deficits*" (Mayntz *et al.*, 1978). Even if using our broader definition of program we might find such deficits, although to a far more reduced extent. However, the notion of implementation deficit might be considered *misleading* because it suggests faultily or even illegal behavior of implementation agencies. Although there might be situations where this is the case, the bulk of implementation difficulties is likely to be caused by situations *beyond* individual responsibilities of agencies' civil servants.

In the case of positive or negative impacts an attempt has been made to establish which of the independent variables and actors activities on the implementation and program formulation levels in particular account for these impacts. The study will lead to a set of *conclusions* indicating which changes in specific procedures, organizational arrangements and program structures would be required under certain situational and system-structural conditions in order to *strengthen environmental concerns* in air quality control policies likely to bring about an emitter behavior with a more positive impact on the environment.

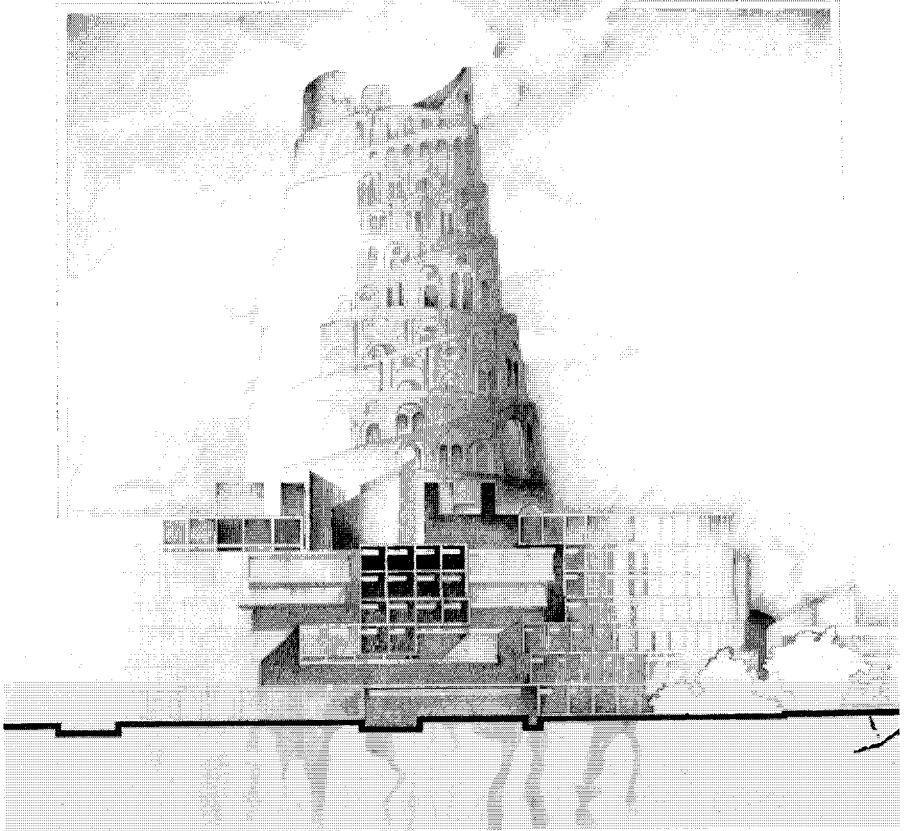
The presented framework has been developed for the particular purpose of analyzing policies in the field of SO₂ air quality control. During the fieldwork it proved to be realistic and operational for empirical social science research. Its discussion with policy analysis projects in other areas suggests that at least the following conceptual elements might be *generalizable* and useful for policy analysis research as a whole: the comparative

approach either for regional implementation areas within one country or for cross-national projects; the bottom-up-approach beginning with implementation analysis and climbing – layer by layer – towards program formulation processes; the inclusion of a comprehensively analyzed impact dimension; the categorization and individual analysis of different types of policy outputs and the related interaction processes; the broad definition of the term “program” encompassing both substantial and organizational programmatic elements; the proposed method to establish the actors analysis; the inclusion of a policy-related set of situative and socio-structural variables into the analysis. Whoever objects that the presented program for policy analysis is too complex to be implemented may be reminded of the fact that political-administrative realities of today are much more complex than in the nineteenth century when their basic principles were developed.

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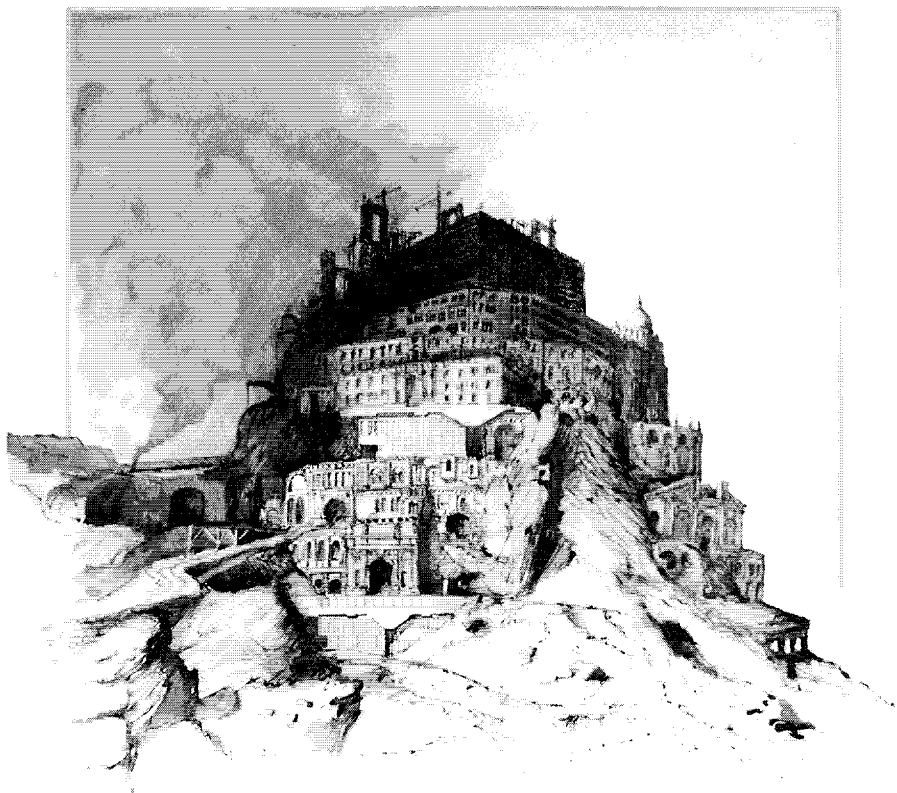
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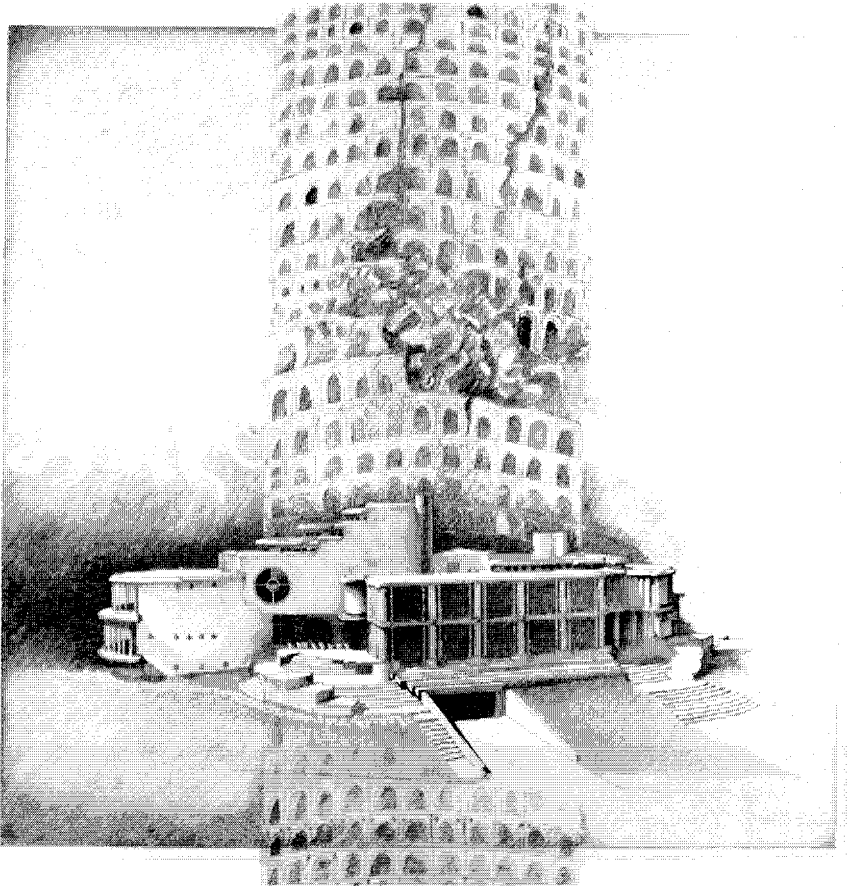
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