

**Organisational frame-setting
as a strategy for the
eco-reform of industry**

**Paper prepared for the workshop
'Process Integrated Technology',
Germany, Bremen, 7 and 8 may 1998**

A publication in the series **CSTM Studies and Reports**

ISSN 1381-6357

CSTM-SR nr. 91

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Enschede, April 1998

The University of Twente is a university for technical and social sciences in the Netherlands.

The CSTM is the interfaculty institute for environmental studies at the University of Twente. The research, educational and advisory activities of the CSTM aim at the development of new strategies for public policy, technology and management as conditions for a responsible environmental protection.

1. Introduction

The central issue in the workshop is how *firms can be influenced in the direction of choosing integrated process technology*. Several aspects will be discussed like the decision-making itself, the role of environmental management systems as a way to institutionalise, within the individual firm, environmental values and considerations.

The organisational aspects of stimulating the use of process integrated technology is of course also an important point of view. In this paper *the possibilities of some forms of over- and inter-organisational co-operation are elaborated*. While doing this, I will lean heavily on research I've done in the Dutch context. The environmental situation in the Netherlands can be characterised in a few words: Because of our high population density, reasonable high productivity and prosperity, our environmental pollution per square mile is very high, among the highest in the world. Among other groups like households, the energy-sector, the agricultural sector, *industry* has to be reformed. Within the framework of the Dutch environmental policy, sustainable development does not mean that industry should be shut down. Rules beyond the attainable are not realistic. Neither should industry be ruined. So economic instruments that strongly affect competitiveness are not feasible. The international context of our open economy is acknowledged by the government and labour unions. Nevertheless industry in the Netherlands has to change its behaviour by:

- 1) adapting and implementing environmental management systems as a way to institutionalise environmental values and considerations within the individual firm;
- 2) preventing environmental burden of production and product by taking, preferably process integrated preventive measures.

The basic approach that dominates our *economic system and national economic policy* is transferred to the world of environmental policy. The so called 'polder-model' relates to negotiations and agreements between government, industry and labour unions on the sensitive balance of productivity, returns, competitiveness, wages, tax-systems, and currency inflation. The same belief in negotiations per branch of industry, reasonableness, covenants is a key factor in the greening of industry in the Netherlands.

In this context, the importance of the organisational settings and communicative instruments for implementing environmental policy, is acknowledged since 1989. This has led to some suitable cases to study the effects on over and inter organisational arrange-

ments. In paragraph 2 we'll start with some more information of the context of these research-projects: the use of instruments in the Dutch environmental policy.

In paragraph 3 and 4 *the possibilities of some forms of over- and inter-organisational co-operation are elaborated*. The findings are taken from two rather large studies, the first one in the field of environmental management systems (paragraph 3) and the second one in the field of pollution prevention projects (paragraph 4).

2. The use of instruments in the Dutch environmental policy

2.1 Development of the Dutch governmental environmental strategies in the last 25 years

In order to understand the context of my empirical remarks I have to spend a few words explaining the pollution prevention strategies of the Dutch government in the last 25 years (Bressers and Hanf, 1995, Bressers and Plettenburg, 1996): The initial strategy was a firm belief in rules as a pollution prevention strategy towards industry. But in the seventies a lot of evaluation research was done that proved that environmental policy based on rules was not very effective. Not to say: not effective. Complex fast changing rules were not tailormade and the reinforcement was the key problem. In the eighties faith was given to economic instruments. Evaluation research on the effectiveness of these instruments proved that economic instruments potentially can be rather effective. This certainly was the case as far as water-pollution by the industry was and is at stake (Bressers, 1983): The levy on water pollution was more cost-intensive than the installation of -often end of pipe- technology. But there are two problems connected to the use of economic instruments. In the first place, as partly has been discussed, the instrument only works when the costs are substantially raised or lowered. Within the framework of free competition in Europe, the limits to raise or lower costs are soon reached. And in the European Union we only go as fast as the slowest partners want to proceed. Besides that industry is successful in their resistance of additional financial burdens. So the conditions for a powerful use of economic instruments are not that good. But, besides that, by the end of the eighties the sector-approach, air-pollution, water-pollution and soil-

pollution was abandoned. The transfer of pollution from one to another sector was no longer acceptable. A preventive approach was called for. At the same moment the increased awareness of the seriousness of the environmental problems led to a raised level of ambition. A more integral approach towards environmental issues made the conservation of air, water and land as separate approaches at once old fashioned. Since this change the key elements within in the Dutch environmental policy are the behaviour of producers and consumers that handle substance and energy-flows. How to make their behaviour more eco-efficient is the key policy theme.

2.2 Actual pollution prevention strategy of the Dutch government.

The central government normally provides an eco-framework that consists of (1) actual situations and expected developments, (2) the agenda of environmental problems on the basis of a eco-analysis and (3) national targets. The global NEPP-themes on the agenda and targets (simplified): climate change (reduction of CO₂ emissions with 20-30%); acidification (reduction of SO₂ emissions with 80-90%); eutrophication (reduction of P- and N- to water with 90%); dispersion of toxic and hazardous substances (reduction of emissions of different substances with 50-90 %); waste disposal (reduction of amount of waste dumped with 60%); groundwater depletion (Reduction of dried out areas with 25%); disturbance (reduction of number of people significantly hindered by noise or odour with 70-90%) and squandering of resources (increased material intensity). Within the national targets sub-targets are set for environmental relevant groups like agriculture, consumers, transport and producers. This is done in the National Environmental Plan, a strategic planning-document that has been discussed in Germany (B. Dalal-Clayton, 1996; Jänicke, Carius en Jörgens, 1997). In order to implement this national plan, efforts have to be made by provinces, municipalities and mentioned groups like households, the agricultural sector, the traffic and transportation sector and industry. The National Environmental Policy Plan is supposed to be co-implemented by provinces and municipalities. To make this possible, provinces and municipalities make their own environmental plans. These plans at lower governmental levels are also made for a few years. As far as industry is concerned, negotiations follow per branch of industry, like the galvanic branch, at the national level. The negotiations result in voluntary agreements between government and the branch-organisation, the so called covenants.

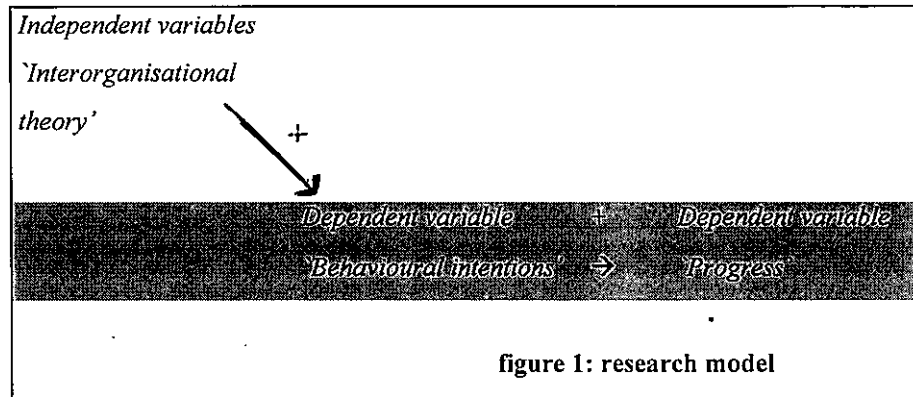
The branch has to accept responsibility for implementation (Arentsen and Kunneke, 1997). This type of strategy leans heavily on the capability of the branch to organise itself. Nevertheless, for the implementation of the National Environmental Plan in the Netherlands, in 60 % rules, are used. In 20 % of the cases economic instruments are used. In 20 % of the cases communicative instruments are used (Van de Peppel c.s., 1997). Important to notice is that a lot of the rules are negotiated regulations. This in the sense that these rules are the net to force those companies that not fulfil the negotiated obligations. And it is industry itself that asks for this treatment. Luckily this leaves enough areas in which the use of instruments is heavily dominated by communicative instruments. In the use of communicative instruments towards industry, the organisational aspects of the steering arrangements are heavily emphasised.

3. Organisational settings and Environmental Management Systems

Our first field in which we studied the influence of organisational settings was environmental management in organisations. Since the Dutch Governmental Memorandum on Environmental Management was published in 1989, the introduction of systems of environmental management in organisations (public and private) has been an item on the political agenda (TK, 1988-1989, 20633, nr.3). Adapting environmental values and the building of environmental management systems were thought to be important steps to prepare industry for the implementation of environmental policy. The target group of this policy consisted of organisations from the private and the public sector. Here no rules, and almost no money were used. An indirect steering model was used that best can be characterised as steering with an intentional use of policy networks. Within this policy network intermediary organisations are partners in policy making and executive duties. These intermediary organisations are supposed to convince and help the firms by adapting and implementing. I researched the implementation and effects of this programme from 1992 until 1996 in co-operation with a colleague and granted by the Dutch Association for Fundamental Research (De Bruijn en Lulofs, 1996):

Research expectations were formulated about the relations between the behavioural intention of the dominant coalition and stable patterns in the behaviour of members of the organisation.

The research model is in figure 1. The variable 'behavioural intentions' re-



garding changes in the rules of behaviour can be placed on a continuum ranging from acceptance to rejection of change. The dependent variable 'Progress' measures stable patterns in the behaviour of members of the organisation concerning: (1) interiorisation/incorporation of environmental values, (2) integration of environmental management into ordinary management, (3) research on the causes of environmental pollution and (4) control and reduction of environmental pollution. Among other, figure 1 raises at least two questions for this occasion:

1. Did the firms implement environmental management systems?
2. To the level that they did implement environmental management systems, can this be explained out of the efforts of the intermediary organisations (i.e. the organisational setting)?

First of all, the expected positive relations between the variable *Behavioural intentions* and *Progress* were confirmed. The found level of progress is reasonable comparable with the descriptive data found by the official evaluation studies performed in 1991, 1992 and 1996 (Calkoen en Ten have, 1991, Sommeren c.s., 1993, Heida c.s., 1996).

More interesting is the explanation of the results. Why did organisations, all more or less from the zero level in 1990, raise to a certain level. Our inter-organisational theory proposed that it was the organisational framework, steering with the intentional use of networks, that can explain the results (in other words: variance in the dependent variables is explained by forms of 'über-betriebliche coöperation').

We assumed that intermediary organisations or network organisations can perform three functions: In the first place a will-influencing function when a network organisation tries to influence the objectives of the target group with regard to the planned policy theme. Secondly we speak of a supporting function when a network organisation tries to help the members of a target group to archive the desired behavioural alternative. Thirdly we speak of a repressive function if the network organisation to steer the unwilling members of the desired direction through gentle or hard pressure (figure 2).

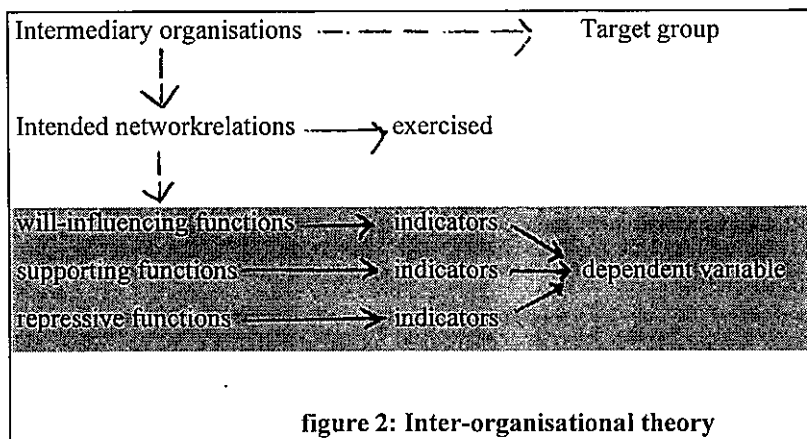


figure 2: Inter-organisational theory

The main research-expectation in this inter-organisational explanatory model is that as the intended network relations are exercised to a greater extent, the members of the target group will show a more positive behavioural intention and a better score on the level of progress. The explanatory power is tested for different organisations: municipalities and four branches of industry. We investigated 74 municipalities with more than 30.000 inhabitants and 143 companies out of four branches.

When we take a look at the explanatory power of the independent variables, inter-organisational steering, we can explain a range between 21,8% and 56,4% of the variance on the dependent variables, all according the test-situation. Best explanations are found in the activities of the VNG, the branch-

pendent variables, all according the test-situation. Best explanations are found in the activities of the VNG, the branch-

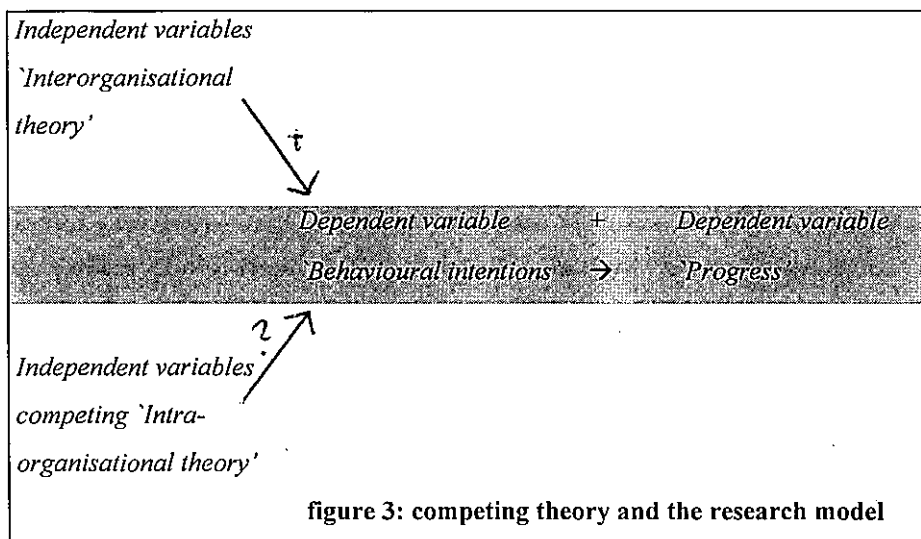
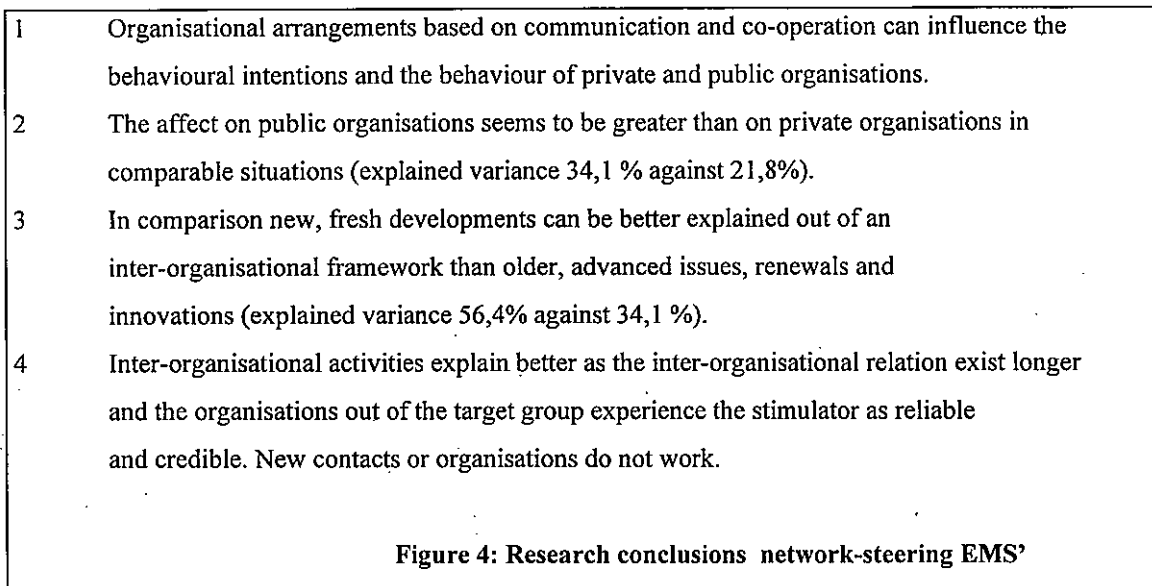


figure 3: competing theory and the research model

organisation of the municipalities and by the branch-organisations of the four branches of industry. We used a very broad intra-organisational, competing, theory which consists of cultural and structural independent variables that are supposed to explain the same dependent variables (compare figure 3).

The explanatory power of this eclectic model varies between 28,8 % and 43,1 % of the variance in the dependent variables. So not more explanatory power like one would expect from a large eclectic competing theory in the tradition of Lakatos (1970). Some conclusions out of this research are summarised in figure 4 :



The third conclusion is in line with that of Angel en Huber. They conclude that private organisations are influenced by external forces as far as entering new items on the agenda is concerned. But where it comes to the quantity and quality of implementations, internal factors explain better than inter-organisational factors (1996). I would like to make a distinction on these conclusions. Empirical analysis on the effectiveness of inter-organisational relations normally forget to categorise the nature of the relation. They are not necessarily of the same nature. As mentioned earlier I distinguished will-influencing functions, supporting functions and repressive functions as categories. It is not unrealistic to assume that the supporting function is effective in a later stage because in order to be interested in how it can be done one should first be convinced that one should do it. But these sequential assumptions did not appear very clear in our empirical research among 74 municipalities and 143 companies. An other common known assumption was once again confirmed in our research. Inter-organisational activities explain better as the

inter-organisational relation exist longer and the organisations out of the target group experience the stimulator as reliable and credible. New contacts or organisations do not work. In our research towards inter-organisational relations there is no such thing as love at fist sight. But that only confirms old findings (Kelman, 1958; O'Reilly 1983). As mentioned earlier, best explanations are found in the activities of the VNG, the branch-organisation of the municipalities and by the branch-organisations of the four branches of industry.

4. Organisational settings and Pollution Prevention Projects

Until this moment I spoke about inter-organisational factors as an explanation for innovation processes. We didn't yet go into the hart of the *explanatory-power of inter-organisational factors as far as the choice for process-integrated technology* is at stake. For this subject I have to hark back to research I and some colleagues did for the Waste Matter Board of the Dutch Ministry of Housing, Physical planning and Environment (De Bruijn, Coenen, Lulofs and Marquart, 1995; De Bruijn, Coenen and Lulofs, 1996). As part of its earlier mentioned new pollution prevention strategy, the central government in the Netherlands has followed a policy which aims to stimulate prevention activities in firms. Pollu-

tion prevention projects were set up to point the way, for one or more firms, to pollution prevention and emission - prevention. Most projects were inspired on the so called

<p>The formal format of the PRISMA method consists of four stages¹:</p> <ol style="list-style-type: none"> 1. <i>Planning and organization;</i> During the first stage a project team is set up which will coordinate the project within the firm. In addition, the areas of attention are determined after a preliminary study. 2. <i>Assessment;</i> After collecting data about the firm, its products and its production processes, prevention options are generated for the problem areas which were found. 3. <i>Feasibility analysis;</i> The options are judged as to their technical and economic feasibility. Also their environmental effects are determined. On this basis a choice can be made as to the best options. 4. <i>Implementation.</i> After analyzing their feasibility, the selected prevention options can be introduced. Attention is also given to the measurement and registration of the effects and the incorporation of prevention activities into the firm. <p style="text-align: right;">Figure 5: formal format of the PRIMA method source: De Bruijn, Coenen and Lulofs, 1996: 41-42</p>
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PRISMA method, which is the best-known and most commonly used pollution prevention

method in the Netherlands¹. This method was developed on the basis of a Prevention Manual issued by the American Environmental Protection Agency (Waste Minimization Opportunity Assessment Manual, 1989).

Over the past years this policy resulted in projects which, while being part of a single main concept, vary as to their structure, methods used, executors and form of financing. A pollution prevention project is a structure in which various participants collaborate.

Per participating company, the concept of pollution prevention project involves at any rate:

1. Inspection of the firm as to:
 - its substance and material flows;
 - the extent of its waste and emission flows (inefficiencies in the substance and material flows);
 - the causes of these inefficiencies.
2. Looking for measures aimed at the reduction of waste and emissions on the basis of:
 - the collected information about waste and emission flows;
 - expertise within the firm and within the team of executors.

Figure 6: The concept of pollution prevention projects
source: De Bruijn, Coenen and Lulofs., 1996: 42

For example, local authorities, branch organizations, environmental advisers and environmental organizations may act as initiators, financiers, executors and supervisors. Hundreds of these projects were and are carried out in the Netherlands.

The central issue of this study, 'which features make a pollution prevention project efficacious, effective and efficient?', was split up, on the

basis of the above considerations, into five research questions. For this occasion I will elaborate on the findings on two questions: (1) Which results are achieved with pollution prevention projects within companies and (2) Which factors influence the project results within companies?

1. In what way are pollution prevention projects implemented?
2. Which results are achieved with pollution prevention projects within firms?
3. Are the objectives of the pollution prevention (projects) achieved?
4. To what extent are the pollution prevention projects efficient and effective?
5. Which factors influence the project results within firms?

Figure 7: the research questions

For this occasion I will elaborate on the findings on two questions: (1) Which results are achieved with pollution prevention projects within companies and (2) Which factors influence the project results within companies?

The first question is *descriptive* in nature and provide a survey of results. These results are summarized in figure 8:

¹ PRISMA is the Dutch abbreviation of: PProject Industriële Successen Met Afvalpreventie (Project Industrial Successes With Pollution Prevention). During this project the method in question was developed further and applied.

<i>Indicator</i>	<i>Effect</i>	Average score	(Minimum score - maximum score)
C1	Number of proposed options	23 (3)	1 - 120 (1-7)
C2	Number of implemented options	7 (2)	0 - 35 (1-5)
D	Positive financial benefits	68%	
E1	Differentiation on the basis of hazardous / non-hazardous waste	50%	
E2	Percentage of product- and process changes	50%	0 - 100%
E3	Environment as selection criterion	3%	

figure 8: numbers and features of prevention measures (scores of control firms in parentheses)
source: based on De Bruijn, Coenen, Lulofs and Marquart. 1995: 46

The first relevant indicator is the number of generated prevention options (C1). An average of 23 options were proposed to the participating companies. On average 7 measures were implemented (indicator C2, see figure 8). We researched so called control companies to be able to rule out autonomous development as the cause for pollution prevention results. Control companies have not participated in projects and were matched to companies that did participate in projects. Far less options were generated implemented in the control firms (see figure 8). We asked respondents whether the pollution prevention activities resulted in positive, negative or neutral benefits within the company (indicator D). In 68% of the companies positive financial results were reported. In 20% the financial result of the prevention project was a negative one.

For this workshop the *fundamentality of the generated and implemented options* is very important. Our first related indicator is the extent to which the distinction between hazardous and non-hazardous waste was taken into account in developing the options (indicator E1, compare figure 8). In other words, are the most hazardous waste flows being dealt with, or are they not given any attention? In half of the companies we investigated we found that this distinction was applied. In less than one third of the control companies, this distinction was made as well. The second indicator (E2) of the fundamentality of generated pollution prevention options is the extent to which the prevention options are focused on product changes and/or technical process changes. The study shows that in the companies that participated in ppp-projects there was a considerable percentage of product- and technical process changes (50%). This means that not only 'good housekee-

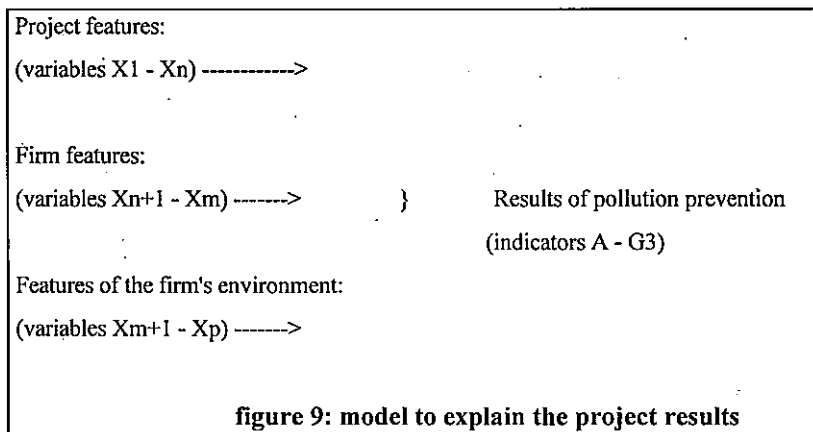
ping' measures, which are often somewhat less complex, were proposed. Too little information was present in the control companies to give a well-founded opinion on product- and process changes.

The third indicator (E3) of the fundamentality of generated and implemented pollution prevention options is the extent to which, in the selection of measures, an environmental criterion was used as the main selection criterion. The respondents were asked whether one main criterion was used in selecting the measures to be implemented.

In selecting measures, feasibility and business-economic criteria appeared to be the main criteria for selection in the majority of companies (77%). The environmental criterion was hardly ever the main criterion (3%). Nevertheless a lot of measures were taken on other than environmental criteria (see figure 8).

The *second* question 'Which factors influence the project results within companies?' is part of the *explanatory* part of the study on pollution prevention projects. Let me first clarify how explanatory

question 5 was dealt with. Since our aim was a comparison between research units (projects and companies) we based ourselves on the ra-



tionalistic tradition in policy evaluation. The *explanatory theory* consists of a model with 62 variables of which it is assumed that they influence the results of pollution prevention projects. The model distinguishes three clusters of independent variables which are assumed to influence the dependent variables from the analysis model. These dependent variables concern the criteria for goal achievement included in figure 1. Let's first summarize the plain outcomes. The 22 variables indeed correlated as expected or remarkable way to the results of projects in terms of indicators C to E3. Figure 10 summarizes the relations between project features and the indicators C to E3:

The design of a project (variables X1-Xn → indicators C-E)

Project feature	Relation to prevention result ²
· there are project executors who concentrate on project management (process guidance) rather than on the executive work	+ implementation of fundamental options o number of options
· it is a group project (little individual guidance, mainly plenary course days)	- number of options - fundamentality of options - implementation of measures
· level of project costs	++ fundamentality of options
· length of time the project is continued in the firm	o number of options o fundamentality of options
· support provided to the firm during implementation of the measures	+ implementation of measures
· the executor of the project is a consultancy firm	- number of options -- fundamentality of options
· the executor of the project is a university	++ fundamentality of options ++ fundamentality of implemented options o number of options

Figure 10: The relation between project features and indicators C-E
source: Based on: De Bruijn, Coenen, Lulofs and Marquart, 1995: 93

Figure 11 summarizes the relations between firm specific circumstances and the indicators C to E3 (on page 15):

2 This table should be read as follows: the more a project possesses a certain feature, the more strongly will the effect occur. For example: The higher the cost of a project, the greater the chance of fundamental options.

Firm-specific circumstances (variables X_{n+1} - X_m → indicators C-E)

Firm feature	Relation to prevention result
· size of the firm	++ number of prevention options o fundamentality of the options o implementation of measures
· branch in which the firm operates	o number of options o fundamentality of options
· number of hours spent on the pollution prevention project by the firm (hours spent internally)	++ implementation of measures + fundamentality of options o number of options
· the extent to which the firm previously participated in pollution prevention or associated projects	++ fundamentality of options - number of options
· size of the firm's environmental department	++ implementation of measures + number of options o fundamentality of options
· the extent to which the firm has a system of environmental care	o implementation of measures - fundamentality of options
· insight of the firm into the waste tariffs imposed on it	+ number of options

Figure 11: The relation between firm features and the indicators C-E
source: Based on: De Bruijn, Coenen, Lulofs and Marquart., 1995: 94

Figure 12 summarizes the relations between firm specific circumstances and the indicators C to E3:

Features of the firm's environment (variables X_{m+1} - X_p → indicators C-E)

Feature of the firms environment	Relation to prevention result
· the extent to which waste processing costs influence the economic result	+ fundamentality of options - number of options - implementation of measures
· the extent to which the firm experiences difficulties in the processing of waste	+ implementation of measures o fundamentality of options
· the extent to which waste regulations were imposed on the firm in the environmental permit(s)	o fundamentality of options -- number of options -- implementation of measures
· the level of environmental pollution in the branch in which the firm operates (according to the firm itself)	++ implementation of measures + number of options
· the extent to which the branch of the firm has a bad environmental image (according to the firm itself)	++ implementation of measures + number of options

Figure 12: The relation between features of the firm's environment and results
source: Based on: De Bruijn, Coenen, Lulofs and Marquart, 1995: 95

This design can of course be turned around. What makes firms to generate and implement fundamental measures, product and process measures. For this occasion I analyzed variety on the indicators E1, E2 and E3. There are 6 significant predictor found that are summarized in figure 13:

Good prospects are there when:
<ol style="list-style-type: none"> 1. The project executors concentrate on project management (process-guidance) rather than on the executive work. 2. The level of project costs are relatively high. 3. The number of hours spent on the pollution prevention project by the firm (hours spent internally) is relatively large. 4. The executor of the project is a university (not a consultancy firm).
Rather bad prospects are there when:
<ol style="list-style-type: none"> 1. It is a group project (little individual guidance, mainly plenary course days). 2. Executor of the project is a consultancy firm.
Surprisingly no relation was found with
<ol style="list-style-type: none"> 1. Branche in which the firm operates. 2. Size of the firm. 3. Length of time the project is continued in the firm.

Figure 13: Conditions for stimulating process integrated technology in PPP's

The research-outcomes presented so far concern 'über betriebliche' arrangements. In the pollution projects participated maybe 1000 companies. But there are about 250.000 companies in the Netherlands that should undertake pollution prevention activities. For that reason up-scaling projects were initiated. In these projects one tries to spread/diffuse earlier outcomes. How to spread this material between company in the same branche or comparable activities in different branches. In other words: How do you reach and convince other galvanic companies in Germany to diffuse the results of the project we spoke about and around during this workshop. The effects of the up-scaling projects were somewhat disappointing. Some conclusions on the up-scaling projects we researched are in frame 14:

1. Simple measures are more easily up-scaled than more complex process or product changes.
2. Be selective towards your target group: Be branch-specific or at least specific for some recognizable activities. In short: be selective towards your target-group.
3. Choose the right messenger for the material. Companies prefer branch-organizations and municipalities. The real reason for that I've discussed earlier: it is the longer existent relation in which trust is vested.
4. The key to success is in the right combination between messenger, material and external counseling.
5. External counseling should be available not compulsory.
6. But some pressure should be executed and but by who is the central theme.
7. Remarkable is that involved company-officials were almost all prepared to invest some time in convincing and coaching other companies in up-scaling activities.
8. Even more remarkable in the Dutch context was that these offers were not used. That combined with choosing the wrong messengers explains the disappointing results of the up-scaling projects.
9. Branche-oriented up-scaling with the use of inter-company assistance can be very fruitful.

Figure 14: Inter-company up-scaling attempts

5. Some preliminary conclusions:

In this paper I discussed the possibilities of some forms of over- and inter-organizational co-operation. Two rather large empirical studies were used to illustrate our findings that 'überbetriebliche cooperation' can be fruitful to incorporate environmental values, to integrate environmental management into ordinary management and to undertake pollution prevention activities. Some conditions are specified that influence the development and implementation of measures that are process-integrated, in a positive direction. For as far as inter-organizational co-operation is at stake we concluded that the efforts that we investigated did not have much effect. We made an inventory of some of the factors that are important in regard to attempts to stimulate inter-organizational co-operation. Branch-oriented upscaling with the use of inter-company assistance can be very fruitful. There is one alternative: specific diffusion efforts for recognizable activities that might be present

in several branches. But it means anyway: some elements of over-organizational co-operation have to be added.

When we raise the level of ambition one step further: towards integral chain management, it is obvious that a lot of effort has to be made in order to raise to the right level of inter-organizational co-operation. And for that new forms of over-organizational co-operation are necessary. New forms have to be elaborated and tested³. Branch-oriented over-organizational forms of cooperation do not fit on product-chains. Nor do the segments in the chain have recognizable similar activities. In the Netherlands we try to organize this by technology-programs; as a condition for funding, demand forms of co-operation over the chain.

³ Maybe with exception of product chains in which one company, in one segment of the chain, has absolute power over the other parties involved.

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