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Het effect van milieubeleid op locatiebeslissingen van bedrijven

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SUMMARY

INTRODUCTION AND RESEARCH DESIGN

It is a common notion that strict reinforcement of environmental policy measures does have an impact on the competitiveness of firms. The conceptions are diverging, however, about the kind of impact these strict environmental measures have on the competitive position of the firms.

It often can be heard from the business sector that an increase of environmental charges will lead to a loss of competitiveness of firms. As a consequence, many firms might decide to close or to relocate. This would be disadvantageous for the economy. This expectation was contradicted by Porter (1991) in a statement that now is known as the Porter hypothesis: "Strict environmental regulations do not inevitably hinder competitive advantage against foreign rivals, they often enhance it". Companies could profit from a strict environment policy, their competitive position might improve.

For the Netherlands, almost no research results are available that go into the firm level effect of environmental standards on location decisions of firms. This research project is an attempt to fill this gap in our knowledge. It examines decision-making processes taking place in firms that have to find an answer to a reinforcement of environmental standards.

The research project has been set up in two parts. The first part consists of a survey among civil servants from municipalities and provinces. The objectives for the survey are:

- estimating the numbers of companies which consider or carry out relocation or closure as a result of environment policy, as well as
- the motivations of the companies for this decision,
- making an inventory of firms which in the second part of the research will be selected for decision-making analysis.

In the second part of the research, for ten firms the decision-making process is analyzed with respect to the location decisions they had to take as an effect of environment policy. The data used were collected in 34 expert interviews with a total of 38 experts. Whenever possible, a decision-making model has been applied. Decision-making models give us the opportunity to analyze human behavior in dynamic decision-making processes in which several stakeholders with different preferences, with various resources, and with varying interests try to influence the outcome of a decision that is binding for all. The objectives of the decision-making analyses were to provide an insight in the development of the force fields during the decision-making process. This consists of:

- an overview of the most important stakeholders that are involved in the location decision,
- the potential influence these stakeholders have at their disposal,
- the stances or positions of the stakeholders,
- the salience that the stakeholders attributed to the location decision, and

- if a decision-making model was applied: the predicted outcome of the decision-making process.

Finally, it was evaluated how useful this approach is for gathering insight in decision-making processes of location decisions of firms that are induced by strict environmental policy.

THEORETIC BACKGROUND

The key words for this study are the concepts environmental policy, decision-making analysis, and location decisions. In the chapters two, three, and four these concepts successively are discussed. Chapter two gives an overview of the policy tools which are available for the implementation of environmental policy: technical standards and economic instruments. The advantages and disadvantages of both types of instruments are discussed. Next to this, the development of the environmental policy and energy policy in the Netherlands is described. The last section covers the international component of environmental policy. EU legislation increasingly forms the policy framework for Dutch environmental policy.

Chapter three discusses methods for analyzing decision-making processes. Decision-making processes are not exclusively analyzed within sociological and political sciences, but also within other scientific disciplines, mainly economics and psychology. The first section of this chapter concisely overviews the developments within these sciences in the field of decision-making research. Next, the development of the decision-making models within sociological and political sciences is outlined. These decision-making models form the state-of-the-art in sociological decision-making analysis and may be considered to be powerful instruments for analyzing and explaining decision-making processes.

Decision-making models involve mathematical computer models, which give the opportunity to gain insight in the course and the outcome of decision-making processes. By means of decision-making an iterative simulation is made of the mutual influence process of the stakeholders who are involved in the decision-making process. The data are collected through expert-interviews. The data collection process forces to structure the representation of decision-making situations. This in itself already leads to insight. An important result of decision-making models further is the predicted outcome of the decision-making process.

First, the structure of the decision-making models is discussed. Several decision-making models have been proposed in the literature. Most of these have the same basic structure. The model elements are potential influence, position, and salience³¹. Like in all scientific models some assumptions are made, notably unidimensionality and single-peakedness of the preference function.

After the decision-making models and their model elements are introduced, the algorithm of the Conflict model is discussed. This model is applied for analyzing

³¹ The Two Stage Model has two extra elements: access and voting power (see Stokman & Van den Bos, 1992 and Van der Veen & Peschar, 1995). In the other decision-making models these elements are contained in the element potential influence.

the decision-making processes of the firms. After a description in qualitative terms, an extensive mathematical description of the Conflict model follows.

Next, a new method is presented for calculating the acceptability of political positions. In this approach, the elements of the decision-making models are used. This method is used in the analyses of the decision-making processes to reach an insight in the degree in which the acceptability of positions changed during the course of the decision-making processes.

The chapter concludes with a motivation for the choice of the Conflict model. An important reason to apply this model is that the Conflict model is an economical model with regard to the number of variables that need to be collected. In comparison, the Two Stage Model needs two extra variables which frequently turn out to be difficult to collect. Moreover, the Conflict model analyses issues independently of each other, which is appropriate in this research.

Chapter four constitutes a transition from the theoretical chapters to the empirical chapters. Most environmental economics approaches depart from the assumption that firms strive for profit maximalization or cost optimization. In 1995, Michael Porter and Claas van der Linde showed that in practice this is not always the case. Firms do not invariably operate at an optimal level. This means that firms do not exploit all opportunities for making profit or saving costs. According to Landis Gabel and Sinclair-Desgagné (1997-1998) this suboptimal operation of firms can be seen as an organizational failure that originates from the organization structure and the operational procedures of the firm. For example, employees can have interests which are conflicting with the interests of the management. Because of these conflicting interests decision-making process on strategic issues for the firm can become controversial, e.g. because the stakeholders hold different positions on the issue and try to influence other stakeholders to reach an outcome that comes as near as possible to their own preferred position. If the stakeholders try hard to influence other stakeholders that hold conflicting positions then during the course of the decision-making process a force field is built up in which the decision-making process takes place. By using the Conflict model it is tried to obtain an insight in the course of the decision-making processes of the firms concerning location issues in the light of environmental regulations. An important point of departure consists of the location options firms have when they have to find a solution for strict environmental measures. Because it is assumed that firms try to reduce costs not all options are equally probable. In this study the following location options are distinguished:

- Compliance. The firm decides to meet the environmental requirements on the existing location by (innovative) adaptations in the production processes or by the application of end of pipe solutions.
- Closure of the firm or closure of a part of the firm, for example a production line.
- Dislocation. Due to environmental requirements the firm decides to invest in production facilities on a new location rather than on the current location.
- Relocation. The firm takes two location decisions at once. Closure of a firm or a part of the firm at the existing location and the start of a new firm at another location.

- Expansion. Extending the production facilities, both on the existing location and on a new location. If it concerns a location decision as a result of stricter environmental policy measures this option does not seem to be obvious.

The chapter is concluded with a section in which the main criteria for the firms are discussed for being selected in the decision-making analyses in this study.

EMPIRICAL FINDINGS, PART ONE: SURVEY ON RELOCATION OF FIRMS

Chapter five is the first empirical chapter, in which the results of a survey are presented. This survey was made in the middle of the year 1998 in a target group of municipal and province civil servants charged with stimulating economic activity and maintaining environmental policy. Of all provinces the heads of the departments for economic development and for the environment were sent a questionnaire and asked to participate in the survey. Moreover, a stratified sample of size 100 was taken from all municipalities in the Netherlands. The largest municipalities with regard to the number of inhabitants were sent two questionnaires. The heads of the economic development department and the environmental department were asked to fill in the questionnaire. The smaller municipalities were sent one questionnaire. In total 174 questionnaires were sent, of which 79 were filled in and were returned. This makes a response of 45%.

The research questions for this first part of the research, and summaries of the answers are the following:

What are the most important motives of firms in the decision-making process as an effect of environmental requirements, when considering relocation or closure of the whole firm or a part of the firm?

Push, pull and keep motives are distinguished. This classification comes from economic geography, which has a rich tradition in investigating relocation behavior of firms. Push motives are location factors connected to the current location that have a negative effect on the firm results. These generally consist of motives concerning costs. Push motives can result in a relocation of the firm. Pull motives are attractive factors of other locations which draw the firm to a new location. These Pull motives frequently become apparent to a firm when it considers how to react to Push motives, and often consist of cost advantages of a new location. Finally, Keep motives favor that the firm remains in the existing location.

- Lack of expansion space and a bad accessibility form the two most important motives for firms to start looking for a new location in the Netherlands where the accessibility is better and where expansion is possible. Therefore, these motives are both a Push motive and a Pull motive. These motives were most mentioned by the respondents for the firms which at the moment of the survey considered to relocate, for the firms which decided not to relocate, as well as for the firms which carried out a relocation within the Netherlands. For this last category, business economic developments formed an important motive as well.

- The most important Keep motive for firms that decided not to relocate is governmental aid and the social and economic ties with the current region.
- For international relocations, according to the respondents, the lower wage costs form by far the most important motive. Another weighty motive is the better accessibility.
- Important reasons for closures of firms are low returns and problems in finding a successor.

What is the weight of environmental demands on firms in comparison with the other factors which play a role at location decisions?

- In general, expansion capacity and accessibility are found to be more important motives than environmental factors. However, environmental reasons do contribute as a motive for relocation or closure. Environment reasons form a motive in the sub-top of relocation motives. On average environmental reasons contribute for almost 10% to the total of relocation motives of firms.
- For relocations within the Netherlands and for firm closures that already have been carried out, environmental motives play a smaller role than for international relocations.

The current environmental policy measures seem to be only an additional factor for companies which consider (international) relocation or closure. An explanation for this could be that in 1997 the environmental costs of an average firm amounts to only 1.0% of the turnover of industrial firms (CBS, 2001).

Does environmental policy lead to Capital Flight in the Netherlands?

This question is answered on the basis of the next operational question:

How frequently are (international) firm relocations considered or carried out as an effect of environmental policy?

- In totally 64 firms were mentioned by the respondents of the survey that in the period of two years preceding the survey seriously considered to relocate as an effect of environmental policy. In this number the firms are included which have considered a relocation, but decided not to carry out the relocation, the firms which at the moment of the survey were deciding upon relocation, and the firms that had carried out a relocation. For the complete Netherlands this leads to an estimate of 284 companies, with a 95% confidence interval from 231 to 337.

Splitting up these categories leads to following results:

- At the moment of the survey, 26 firms considered relocation because of environmental requirements, of which four considered an international relocation. This leads to an estimate of 90 firms for the Netherlands and a 95% confidence interval from 38 to 143.
- In the two years before the survey took place 15 firms considered a relocation as an effect of environmental demands but decided not to carry

it through. For the Netherlands, the total number is estimated at 83, with a 95% confidence interval of 38 to 151.

- During the two years preceding to the survey 23 firms carried out a relocation in which environmental reasons played a role, of which four to another country. The estimated number of firms for the Netherlands that carried out relocation because of environment reasons amounts to 110. The 95% confidence interval is 65 to 172.

Due to the small number of observations relatively large standard deviations and broad confidence interval are found around these estimates.

- Eight firms (of the 64 inventoried firms) considered or carried out an international relocation. For the Netherlands this leads to an estimate of 33.
- If these 33 companies are related to the total of 750,000 firms which are known to be active in the Netherlands, the conclusion can be drawn that Dutch environmental requirements for firms form no reason for large-scale Capital Flight.

In which economic sectors do firms consider or carry out relocation or closure because of environmental requirements?

- Firms in the metal products industry and in the food, beverages and tobacco industry were most often mentioned by the respondents. However, within these sectors large numbers of firms are active.
- If the results are corrected for the number of firms in each sector, then another picture arises. It turns out that due to environmental policy, firms in the basic metal industry and in the coke and oil refinery industry relatively most often consider relocation or closure. For both sectors almost 3% of the firms considered relocation or closure. These are the sectors which have to do with relatively high environmental costs.

Industrial sectors with relatively high abatement costs, the basic metal industry, the coke and oil refinery industry, show the highest percentages of firms which have considered or carried out a relocation. This result suggests that the level of the abatement costs exerts influence on the location behavior of firms.

Although agrarian firms were not excluded in the survey only relatively few agriculture firms were inventoried that considered relocation or closure as an effect of environment policy measures. The sampling procedure leads to an under-representation of the country municipalities. Therefore the number of agrarian firms that due to environmental requirements relocates or closes possibly is underestimated.

EMPIRICAL FINDINGS PART TWO: DECISION PROCESSES

In chapter six, the decision making processes are reported of ten firms that have been selected for decision making analyses. These firms had to find an answer to a reinforcement of the environmental requirements. Wherever possible the Conflict model was applied.

The first problem formulation for this part of the research is:

Which location decisions are considered by the firms which were selected for decision-making analysis?

The answer on this question is summarized in Table 1.

Table 1

**FIRMS THAT HAVE BEEN SELECTED FOR DECISION-MAKING ANALYSES
TO ECONOMIC SECTOR AND LOCATION DECISION**

| Firm | Sector | Location decision* |
|-----------------------|-----------------------|---------------------------|
| Steel plant | Basic metal industry | Innovation |
| Zinc smelter | Basic metal industry | Closure/Innovation |
| Aluminum smelter | Basic metal industry | Closure/Innovation |
| Oil refinery | Oil refinery industry | Relocation |
| Oil refinery | Oil refinery industry | Innovation |
| Fertilizer plant | Chemical Industry | Closure/Innovation |
| Fertilizer plant | Chemical Industry | Closure/Innovation |
| Chamois leather plant | Leather industry | Relocation |
| Dairy farm | Agriculture | Dislocation |
| Dairy farm | Agriculture | Relocation |

* It concerns the location decision which was considered or was carried out at the moment of the data collection.

In principle, firms can react on environmental policy by compliance (for example innovation), closure, dislocation, relocation, or expansion. This appeared reasonably consistent with reality. Only for expansion no suitable case could be selected. The other location decisions were considered by one or more of the selected firms. In most cases (six) the location decision was formed by innovation. At four of these firms, the decision was a choice between innovation and closure. Paying levies or taxes formed no option for these firms. Innovative solutions in order to comply with the environmental demands formed the only opportunity to escape from closure. This appeared to be a hard decision since on the one hand closure would mean a loss of jobs and a loss of economic activity, on the other hand innovation would demand high investments. It concerned controversial decision-making processes, which was expressed in the conflicting interests between a number of the stakeholders. They preferred incompatible outcomes of the decision-making process. In most of the cases this concerned the decision-maker, frequently the executive board, which was held responsible for the return on investment, against the local management team. The executive board tried to minimize the costs. The local management team gave the highest priority to continuation of the firm. For two of the selected firms a good dataset could be collected during the expert interviews, which enabled a simulation of the decision-making process with the Conflict model. For these cases a deep insight in the decision-making process was obtained.

For eight cases a model simulation with the Conflict model appeared not to be feasible.

- In four cases the decision-making eventually proved not to be controversial. The decision could be taken on the basis of a cost-benefit analysis, on business economic grounds. This was unexpected for the international relocation of the chamois leather plant and for the concentration of activities of the two oil

refineries. In these cases many jobs were lost, which in many other cases leads to highly controversial issues.

- There was hardly the matter of controversiality at the chamois leather plant and at the second oil refinery. At the oil refinery this was the case, because a favorable social plan was offered to the employees that were laid off. At the chamois leather plant, most employees were unorganized and semi-unskilled. No conflict arose at the chamois leather plant, because the interests of the firm and the municipality appeared to complement each other. Because of increasing environmental nuisance the firm would have to invest considerably on the existing location in order to continue the production of chamois leather. At first the firm looked for a new location in the same municipality. The company was prepared to make large investments, but could not get a guarantee that in the long term no other high environmental investment would be necessary. The discharge water with a high salinity possibly would be too harmful for the environment. The firm decided to leave the municipality and opted for an international relocation. The municipality did not put much effort to keep the firm within the municipality. The departure of the firm was convenient for the municipality, because the municipality planned to develop an office park at the plant area. Eventually the company decided to relocate to Mexico and the municipality bought the plant area and realized the office park.
- The decision-making of the two agrarian firms concerned a decision which was taken within the small family circle. Only a few stakeholders experience disadvantages of an international relocation of an agricultural firm. Because of this there was no controversiality in these decision-making processes. Environmental aspects played only a small part in the decision-making of the cattle farmers to consider relocation. In both cases it was a decision which was taken on the basis of a cost-benefit analysis. Therefore a decision-making model is not the most suitable method of analysis.
- For three cases no reliable data could be collected during the expert interviews. This concerns the second phosphorus acid plant, the steel plant, and the first oil refinery. At the fertilizer plant and the steel plant representatives of the firms themselves were not available for an expert interview. The experts that could be consulted appeared to have insufficient insight in the decision-making process to be able to reliably assess all model elements. Also for the second oil refinery no reliable data could be collected. The experts, some of whom had been present at the negotiations on the basis of which the decisions were taken, had problems recollecting the exact positions of the other stakeholders.
- For the zinc smelter, there was not much to choose for the firm when deciding for innovation. Research was undertaken for examining end-of pipe solutions. These turned out to be unfeasible from a business economics point of view. In the end only one option remained. This option appeared to be feasible and the executive board of the firm happily decided for this option through which the continuation of the zinc smelter was made possible. Since it was the only feasible option, an analysis with a decision-making model would not be sensible.

For the cases where the analysis with the Conflict model was not possible, the contexts of the decision-making were outlined and the decision-making processes were described using the structure offered by the decision-making models. The decision-making issues, the stakeholders that are involved in the decision-making process, and the outcome of the decision-making process were presented. Of the two agrarian firms one farmer could not be traced, so for this firm the final decision is unknown and no outcome of the decision-making process is available.

What are the circumstances under which decision-making processes of firms that have to answer strict environmental policy measures become controversial?

In the preceding paragraphs it has already become clear that location decisions differ in the degree of conflict which they bring about. Location decisions with an impact that stretches beyond the boundaries of the firm potentially bear a higher amount of conflict, because more stakeholders are involved and the chance increases that their interests conflict. This applies to firm closures, firm relocations, and the process innovations that lead to a loss of jobs. The loss of jobs and the resulting social impact of these location decisions can lead to controversy. Characteristic for this controversy is the diversity of positions held by the stakeholders which results in conflicting powers that cause force fields. These kind of location decisions are in principle suitable for the analysis with decision-making models. Nevertheless, this does not apply to all cases in which the location options were considered as is shown by the cases of the chamois leather plant and the second oil refinery. At the chamois leather plant the interests of the actors with potentially contradictory interests converged, so that this controversy did not show up during the decision-making process. This happened as well for the second oil refinery, because a beneficial social plan was made for the employees who were made redundant. According to one of the experts many former employees of the refinery nowadays own a second home in Spain or France.

In three cases the tenacious position of the government in upholding the environmental requirements caused controversiality in the decision-making process. The two fertilizer plants had to reduce the discharge of polluted waste gypsum by 90%. The government persisted in this technically oriented measure and the firms did not receive the opportunity to pay a levy for this discharge. At the zinc smelter the government upheld the environmental measures as well. The zinc smelter had to end the production of the toxic waste product jarosite. Processing of the jarosite appeared to be too expensive. So closure seemed to be the only solution to end the jarosite production of the zinc smelter. Nevertheless the zinc smelter continued to exist because in Australia during the decision-making process a zinc ore was found that was useable for the zinc smelter which made it possible to produce zinc without releasing jarosite. This was an important stroke of luck, which enabled the continuation of the zinc smelter.

*Which stakeholders turn out to be crucial at the location decisions of the firms?
Which positions do these stakeholders take?*

And

How is the potential influence divided among the stakeholders?

Location decisions of firms ask for large long term investments. These investments have a strategic nature and give a long term direction to managing the firm. At the two firms of which the location decision has been analyzed with the Conflict model, the final decision for these issues was taken by the executive boards. This goes as well for most of the other cases. In general it can be said that the decision-maker is the most important party: the executive board. However, this does not mean that the executive board operates in a vacuum and is totally free in taking the decisions. The interests of other stakeholders have to be taken into account. These other stakeholders indirectly or directly try to influence the board using their resources in order to reach a shift of position of the board in their own policy direction, which can be opposite to the original position of the board.

The decision-making analyses with the Conflict model gave insight in the influence of these stakeholders. The executive board appeared to be sensitive for the influence attempts by other stakeholders and adapted its position to the positions of other stakeholders that disposed over less potential influence. The simulations showed that large position shifts can be modeled successfully. In the first case, at the decision-making process of the fertilizer plant, the position of the executive board shifted from in favor to against the construction of the gypsum reworking plant. The simulations with the Conflict model showed that this change of position was mainly an effect of the strategic actions of the competitors in the fertilizer industry.

At the beginning of the decision-making process the executive board of the aluminum smelter had a preference for a moderate increase of production. After the decision-making process their position had moved to a much larger scale increase, including a radical renewal of the aluminum smelter. The responsible actor for that was the workers council of the aluminum smelter, supported by the local management team.

To what extent do the stakeholders try to reach their preferred policy outcome?

In the case of the fertilizer plant the experts attributed to the executive board a salience of 0.6 on a scale of 0 up to 1. The salience element measures to what extent the original position is pursued. A salience of 0.6 shows that the board attributed relatively much salience to this issue. This can be carried back to the fact that the production of fertilizer forms a core activity of this concern. Nonetheless the position of the executive board changed under the influence of the positions of the other stakeholders. In the end of the decision-making process the final position of the board had shifted to a position against the construction of the gypsum reworking plant.

In the case of the aluminum smelter at the decision concerning the technology issue after the continuation of the aluminum smelter, the experts attributed the highest salience to the board (0.9). During the decision process the board also made a large shift of position under the influence of the other stakeholders.

In both cases the boards had many resources at their disposal (potential influence) and attributed much salience to the issue. However, this does not automatically mean that the preferred outcomes of the decision-makers form the outcome of the decision-making process. The analyses show that the decision-making process is the result of a collision of forces, in which other stakeholders can exert a considerable amount of influence, for example by joining a coalition.

Which decisions were finally taken by the firms?

Table 2 indicates the cases for which the Conflict model has been applied and to what extent the predicted outcome is in agreement with the real outcome of the decision.

Table 2

**DECISION-MAKING OUTCOMES OF THE SELECTED CASES
AND THE APPLICATION OF THE CONFLICT MODEL**

| Firm | Conflict model | Predicted outcome | Real outcome |
|-----------------------|-----------------------|--|--|
| Fertilizer plant | Yes | Closure | Closure |
| Fertilizer plant | No | | Closure |
| Aluminum smelter | Yes | - Continuation smelter - Investments of 126 miljon Dutch guilders in innovative production techniques | - Continuation smelter - Total innovative investments of 150 miljon Dutch guilders |
| Chamois leather plant | No | | International relocation |
| Zinc smelter r | No | | Innovation |
| Steel plant | No | | End-of-pipe solutions |
| Oil refinery | No | | Innovation |
| Oil refinery | No | | Relocation |
| Dairy farm | No | | Unknown |
| Dairy farm | No | | International relocation |

The model simulations for both cases led to forecasts that are in line with the real outcomes of the decision-making processes: closure of the fertilizer plant, continuation of the aluminum smelter and high cost innovative investments for the aluminum smelter.

What motives do the firms have for the location decisions?

According to the experts the most important motives for the firms are market-oriented motives. This could be motives concerning the improvement of the market position or uplifting the competitive position, increase of profit margins, and minimizing raw material prices. So, even in the selected cases, in which the decision-making process is a reaction of the firm to strict environmental policy measures, the most important investment motives are formed by market motives. In most of the selected cases the environmental policy measures acted as a booster for the decision-making process and the environmental policy measures define the framework within which the decision-making takes place. Firms consider abatement costs as a budget item, not fundamentally different from

other budget items firms have to take into consideration, such as wages, energy costs, and maintenance costs.

Because environmental abatement costs for firms on average amount to 1.0% of the turnover (CBS, 2001), this only forms a small budget item in comparison with other budget items. Therefore, it can be defended that the influence of the environmental abatement costs on the location decision of the firms is relatively small.

To what extent does the Conflict model correctly predict the outcomes of the decision-making processes of the firms that result from environmental policy measures?

The expert interviews for both cases were held considerably before the final decision was taken. Three issues were analyzed. The predictions of the outcome of the decision-making processes on the basis of the Conflict model simulations are real ex-ante forecasts. For all three issues the Conflict model correctly predicted the decision-making outcomes. This is in accordance with the high success rate of the Conflict model at other decision-making situations (see Bueno the Mesquita, 2000).