2. DESIGN OF THE RESEARCH PROJECT

2.1 Introduction

Lacking a theoretical starting point to investigate the research questions formulated in chapter 1, a research procedure still had to be found. Because of this lack of theoretical perspective, the nature of this research project is descriptive, comparative and explorative. As a descriptive and comparative analysis, the research project demonstrates a systematic search for the institutional structure of (waste) sectors. As an exploratory project it tries to illuminate certain relations between waste sector structure and waste reduction, which then become the input for proposals to adapt the present structure of the waste sector in the Netherlands.

The waste sector, the subject of this research project, is a complex social phenomenon. The waste sector forms an interorganizational network, which is internally complex; there are many actors and although they sometimes have common interests, they also have diverging ones. This was established in the first exploration of impediments to waste reduction in the structure of the Dutch waste sector (de Jong & Wolsink, 1993). The best way to find out what the effect would be on waste reduction was to examine the structure of other (waste) sectors with respect to these elements. By examining case studies of foreign sectors, ideas for improvement of the structure of the Dutch waste sector were found. Conclusions could be drawn on the relationship between the structure of a waste sector and waste reduction, and proposals for altering the Dutch waste sector were formulated. In ex-ante evaluation, the possible problems of implementing the proposed adaptations were examined, as were the expected effects of altering (parts of) the existing structure with regard to the size and composition of waste streams.

In this chapter, the methods applied in this research project will be presented. First, the design of the research will be described. Then, each phase of the research project will be outlined in detail.

2.2 Design of the Research Project

The method used in order to fulfill the purpose of this research project is based on work by Yin (1984) and Van Eynatten (1992a, 1992b). According to Yin, the case-study strategy can be used explicitly in explorative research in which the context of a phenomenon has to be studied. Yin (1984, p.23) defines a case study as:
"An empirical inquiry that:
• investigates a contemporary phenomenon within its real-life context; when
• the boundaries between phenomenon and context are not clearly evident; and in which
• multiple sources of evidence are used."

When the central proposition of a research project cannot be sustained by theoretical viewpoints and when the research questions concern a constellation of multiple relations between variables instead of counting frequencies of scores on certain variables, the case-study strategy may be chosen. This research project as a whole can be seen as a single case study of the waste sector in the Netherlands, embedded with comparative case studies.

Van Eynatten's methodology is used as a supplement to Yin's. Van Eynatten has prescribed a methodology that can be followed when propositions cannot be tested and thus the predictive stages in the 'Empirical Cycle of Research' (De Groot, 1961) are not applicable. Van Eynatten proposed a 'Regulative Cycle of Diagnostic and Consultative Thinking'. This 'Regulative Model' contains five steps:
• definition of a problem;
• diagnosis;
• plan;
• intervention, and
• evaluation of the intervention.

Following Yin's instructions on how to set up case-study research and using Van Eynatten's Regulative Model for research, six phases in the research project have been designed:
1. Description of the organizational structure of the Dutch waste sector;
2. Analysis of impediments for waste reduction in the structure of the Dutch waste sector;
3. Single case studies;
4. Comparison of cases and generalizing conclusions;
5. Recommendations for optimizing the structure of the Dutch waste sector, and
6. Exploration of the applicability of the recommendations.

Although the six phases of this research project correspond with the steps in the model of Van Eynatten, there is a difference. In this context, the intervention in step 4 of Van Eynatten's model cannot be carried out, because a practical intervention is far beyond the scope of this project. Thus, the intervention, as well as the evaluation in his step 5, remain hypothetical. In this research project the evaluation does not concern an evaluation after applica-
The first four phases of the research project depart from the current, practice-based situation. The last two phases focus on a hypothetical structure in which conclusions drawn in earlier phases are incorporated.

Phases 1 and 2 aim to describe the waste sector and point out the underlying features causing impediments for waste reduction in the structure of the waste sector. It was not possible beforehand to formulate organizational features on which the description of the waste sector would be based. The reason for this difficulty is that prior to this project neither an overview of the waste sector as a whole was available, nor any usable theoretical framework. Because there was no theoretical starting point, the first phases of the investigation only had an inductive nature. The analysis of impediments functioned as the starting point from which solutions were sought through induction. The relations between structural elements and waste reduction in case studies were focused upon in phase 3. In phase 4 the cases provided evidence for conclusions that go beyond the case studies. In phase 5 a process of deduction led to the formulation of recommendations for adaptation of the Dutch waste sector. Finally, in phase 6 of the project, the applicability of these recommendations was discussed.

2.3 The Six Phases of the Research Project

In the following, a closer look will be taken at the six phases of the research project. For each phase it will be indicated what activities have taken place, in which period of time, and with what result. An explicit formulation of the impediments (part of the results of phase 2), as well as the formulated solutions to the impediments (which also form the selection criteria in phase 3) will be included in the subsequent description of the phases, because of the essential role they play in the described research method.

2.3.1 Phase 1: Description of the organizational structure of the Dutch waste sector

The research project started with an inventory of the organizational structure of the waste sector in the Netherlands. This phase was conducted in the period of November 1992 to August 1993. The result of this phase was recorded as a description of the waste handling situation at that time (De Jong & Wolsink, 1993). It included information about the quantities of waste categories, but it also gave an overview of
Dutch waste law and waste policy, as well as a short historical overview of Dutch waste management practice. Furthermore, it described several groups of actors that are participating in the waste market and/or are involved with the waste policy-making process, as well as the ways they are related to each other.

The data were gathered by investigating organizations’ records, official policy documents and research reports. With these documents, key actors were identified and their relations to one another were examined. The interests linked to the relationships and the positions of the organizations in the network were established. The data are principally of a qualitative nature. In addition, data were gathered by interviewing twelve key persons within selected organizations. The description of the inter-organizational structure was updated by adding missing data that were obtained from the interviews. The interviews were used principally to validate the information and to identify impediments in the structure of the waste sector.

2.3.2 Phase 2: Analysis of impediments for waste reduction in the structure of the Dutch waste sector

In this phase, impediments for waste reduction that are linked to the structure of the Dutch waste sector were indicated. The analysis of impediments for waste reduction in the structure of the Dutch waste sector started with a categorization of organizations with vested interests in waste handling. The way in which these organizations manage to gain influence on the manner in which waste is handled is explained, as well as the mutual relationships between organizations.

This phase was conducted between August 1993 and July 1994 and the results are presented in De Jong & Wolsink (1997). In this article (see chapter 3) the main barriers to waste reduction in the structure of the waste sector are discussed.

In order to find solutions for these impediments, the following elements appeared to be relevant:

- dividing functions in the waste market;
- rearranging tasks and responsibilities of public authorities;
- changing the content of conditions for transactions, which are the concrete form of the relations between organizations within the waste sector;
- removing the difference in scale level in which activities of public and private organizations take place, and
- attributing responsibility for waste reduction to an actor already active within the sector, or to an organization which has yet to be created or
which can be newly formed by splitting up or merging currently inactive organizations.

These conclusions about the relationships between certain aspects in the structure of the waste sector and the conditions for waste reduction led to the indication of five structural elements which will be described in the next section.

2.3.3 Phase 3: Single case studies

Single case studies were conducted between July 1994 and December 1997. The purpose of these case studies was to identify examples of waste structures abroad which show how different organizational conditions affect waste reductive initiatives, and which may reasonably be expected to do the same when introduced in the Dutch situation. Based on the analysis of impediments in the Dutch situation, induction has led to the formulation of five elements which appear to contain solutions. These five elements were used as criteria for the selection of suitable casestudies.

The choice of three other cases besides the Dutch waste sector for a multiple-case design was a practical one. To conduct three casestudies was feasible within the allotted time. According to Yin (1984), a small number of cases does not limit the scope of the results, because the possibilities for generalization are determined by whether the logic behind case studies is reproducible. Even in a research project in which theory cannot be tested, generalization of the results is allowed as long as the replication logic that is underlying the multiple-case design is made explicit. All presumptions, subjective choices and conclusions made are presented thoroughly in this chapter and elsewhere in this study, so the reader may decide for himself whether or not to accept all the conclusions drawn.

a. Structural elements as selection criteria

The five elements for selection were chosen at the end of phase 2 of the research project. These five elements were formulated after analyzing the most significant impediments to organizing the flow of waste streams within a society for waste reduction. They appeared to be essential for removing impediments in the structure of the waste sector:

I. Separation or integration of functions in the waste market
II. Outlining conditions for transactions in the waste market
III. Explicitly defining the roles of public authorities
IV. Changing the level of scale in the planning of waste management
V. Obliging an actor to take responsibility for waste reduction

Some elements are more complex than others.
In phase 1 the collecting, processing and disposal functions were distinguished from one another. The unbundling of collection and processing or disposal functions appeared to be particularly necessary to prevent conflicts of interest. As a result of these entangled interests, waste reduction is of minor importance to participants in the waste market. The conditions for transactions within the waste market may also indirectly result in entwining conflicts of interest. This problem could possibly be solved by altering physical, financial or legal relations between actors. Another way of looking for solutions is found in limiting the possible roles of public authorities. The scale of planning also appears to be an essential element in organizing waste handling. The last structural element that has been recognized as potentially important in the removal of impediments is the responsibility for waste reduction. Often there is no one accountable for achieving waste reduction initiatives; often waste reduction only has priority in policy plans. A promising concept seems to be the assignment of responsibility for waste reduction to the manufacturer of a product.

b. Selection of cases

In order to select the three cases out of a range of twelve potential cases, common background information and specific information about the waste sector in question was needed. In particular, information about the latter was hard to find. No reviews of the state-of-the-art were available for the three chosen countries. Documents describing in-depth information about waste sectors, similar to those describing the electricity sector in several OECD countries (International Energy Agency, 1994) do not exist. The procedure for selection of the cases was very pragmatic and was time restricted. Therefore, first the department library at the university was screened for literature and other documents about foreign waste sectors. Colleagues were asked for information and their advice about foreign waste situations. The availability of information was used as the first step in selecting cases. A second criterium was the economic level of a country: only OECD countries were included in the selection.

All available literature and other data was screened per country for information describing items such as:

- volume and quality of waste flows;
- participants and transactions in the waste market;
- proposals and applied instruments of waste policy, and
- tasks and roles of public authorities.

This information was used to compare the twelve OECD countries regarding the five structural elements, which formed the basis for the final selection of three case studies. The selection procedure is extensively reported in De
Jong (1994). The result of the comparison between waste sectors in the twelve OECD countries and the most crucial selection criteria can be found in Appendix 1. Information about the five structural elements, as described in paragraph 2.3.2, was the most important basis for selection. Language was also an important criterion for selection. Figure 2.1 illustrates the information available at the moment the case studies were selected.

Figure 2.1 The outcome of the comparison of the selected case studies on the five structural elements

<table>
<thead>
<tr>
<th>Core elements</th>
<th>Denmark</th>
<th>New Jersey (USA)</th>
<th>Dual system in North Rhine-Westphalia (FRG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separation of functions in the waste market</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Conditions for transactions</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Waste market: mainly private actors</td>
<td>+</td>
<td>?</td>
<td>+</td>
</tr>
<tr>
<td>Waste management planning on a national scale</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Responsibility for waste reduction lies with producers</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

1 Not all the information needed for comparison of the 12 potential cases was available. Missing information on an item at the time of selection is marked by a "?"

The selection process resulted in the selection of three cases: Denmark, New Jersey (USA) and the dual system in North-Rhine Westphalia (Germany). Denmark was selected mainly because public authorities have withdrawn as participants in the waste market in order to give it a more free market character. Regulation by the authorities should take place indirectly by the application of market-based instruments.

New Jersey was selected as a state that uses strong regulation of the waste market in order to control the flows of waste. Besides, many initiatives for waste reduction were to be expected in the United States, since it is seen as the birthplace of the concepts of waste prevention and source reduction.

The dual system in North Rhine-Westphalia has been selected as a case in which the concept of product responsibility was applied in practice. The Packaging Ordinance not only resulted in a vertical separation of the waste
market, but also a horizontal separation, because next to the market for solid waste there came to be a market for packaging waste.

The waste sector in New Jersey was studied first. Respondents in New Jersey were visited in May 1994. Next, the study of the dual system in North Rhine-Westphalia was conducted. Interviews were held in June 1995. Denmark, the third case study, was visited in October 1996.

c. Data collection

During all phases of the research project a review of current literature has been combined with empirical studies. The examined literature focuses on the following issues:

- the structure of the waste sector in the Netherlands;
- the structure of other Dutch sectors including electricity;
- the structure of waste sectors abroad; environmental effects of the different waste treatment systems, and
- general, more theoretical background literature like organizational sociology, technology assessment and institutional economics (cf. van Leenders & de Jong, 1996).

The character of the research project is explorative. The study of literature is only a tool to get access to the social phenomenon that forms the study object. As a consequence, the extent to which the conclusions of this project can be generalized is limited. In order to broaden the external validity of the results, the underlying replication logic in the comparative case-studies is held constant (Yin, 1984). This statement means that the same five structural elements were examined in all case-studies. According to Yin, this consistency is a prerequisite for providing a basis for generalizing the results from the comparative case-studies. We did not strive for generalization about populations or theory, but only about cases and topics. With the multiple-case study we tried to find common tendencies in other (waste) sectors that are applicable to the waste sector of the Netherlands. The purpose of the empirical case studies was to obtain ideas about improvements for parts of the structure of the Dutch waste sector.

d. Case study procedure

The approach for studying the three cases abroad was basically similar for each case.

First, more written information was gathered in the Netherlands by searching for reports and literature in libraries and by obtaining general information from embassies. The information did not usually contain more than a general description of the countries' waste policy. Information about
the actors participating in the waste market and the relations between them could rarely be found.

The visits to the countries were prepared for by contacting key persons within the waste field by telephone. Names and addresses of potential respondents were found through a so-called ‘snowball method’: each person that was contacted by phone, was asked for names and addresses of persons that in the contact’s opinion should be asked for an interview. Through this approach, a list was composed of representatives of special groups of organizations within the three foreign waste sectors. For each case, a limited number of respondents were interviewed. The respondents are assumed to represent the different parts of the waste sector that were thought to be relevant by the other respondents.

Each person that agreed to an interview was sent a letter which contained an endorsement of the appointment, a statement about the project, its purpose and the fact that the project was financed partly by the National Research Program on Global Air Pollution and Climate Change. A review of the major questions covered in the interviews was also included (see Appendix 2).

Each case is descriptive because little theory was available that could provide causal links between variables beforehand. Different sources of evidence were used. Newspaper clippings and articles appearing in mass media have been used, besides administrative documents, such as progress reports and internal documents and archival records. Another important source of information for the case studies were the interviews. The limited time available for an interview, usually one or two hours, required the use of a focused interview. The interviews remained open-ended, but a certain set of questions derived from the case-study protocol had to be followed.

After describing the situation abroad and analyzing the relationship between waste reduction and the five structural elements, each respondent was sent a report with a request to read and comment on it. The first draft of the report could then be accordingly adjusted.

2.3.4 Phase 4: Comparison of case studies and generalizing conclusions

This phase began with a comparative analysis of the three single case-studies. This analysis, which is presented in chapter 7 (De Jong & Wolsink, 1999), yielded a number of conclusions, which constituted the start of the next step. The conclusions based on the multiple case-studies and other information beyond the case studies, such as literature that was reviewed, were presented in brief.
A second comparison was made between the waste and electricity sectors in the Netherlands. This comparative study was carried out between December 1995 and July 1997.

Tellegen has argued in several publications that a comparison of organizational conditions aimed at an efficient use of energy, water and housing is instructive (Tellegen, 1989; 1995; Tellegen et al, 1996). As Tellegen already indicated in his inaugurational speech of 1989, a comparison of the waste and electricity sectors promised to be very fruitful. There was also a pragmatic reason for selecting the Dutch electricity supply as a case study: a colleague, Stephan Slingerland, is conducting a related research project in which he looks at the relationship between reduction of electricity demand and the organization of electricity supply (Slingerland, 1999).

Therefore, the organization of the Dutch electricity supply sector has been studied as an analogy of the waste sector, which both face the dilemma of stimulating demand reduction, while at the same time fulfilling the need for reliable services at all times and for everybody (Slingerland & De Jong, 1998). In chapter 8 this thought experiment is presented, based on two considerations: i) to involve organizations from both sectors in demand reduction for environmental reasons, and ii) to resolve obstacles that have a common underlying basis in the present organization of both sectors.

2.3.5 Phase 5: Recommendations for optimizing the structure of the Dutch waste sector

All conclusions drawn from former phases were integrated and made into recommendations for optimizing the structure of the future Dutch waste sector. This phase of the research project was finished in February 1998. The results are summarized in the first pages of chapter 9. The complete handout that resulted from this phase can be found in Appendix 3. The handout was used in the last phase (6) of the research project.

2.3.6 Phase 6: Exploration of the applicability of the recommendations

In this last phase of the project, the practical applicability of the recommendations, as well as the likely effects on waste reduction were explored. According to Van Eynatten’s Regulative Model for research (1992a and b), after formulating an intervention to deal with the problem studied, the intervention has to be evaluated. In this research project, the intervention remains only hypothetical and therefore, only ex-ante evaluation can be done. This phase was conducted between March and May 1998. The results are presented in the last chapter of this thesis. This chapter is based on a

The ex-ante evaluation was done by sending the handout (Appendix 3) to 21 persons. Some of them were respondents, who were interviewed as part of the case-studies, and showed much interest in the results of the project. Others are authors of studies which include proposals for altering (parts of the) structure of the Dutch waste sector. Finally, some key persons within the Dutch waste sector were also interviewed. The first two groups were asked to give their comments either in written form or by telephone.

In total, nine interviews took place. The persons who were interviewed represent organizations within the waste market, such as collectors, processors and disposal companies, as well as public authorities (at different administrative levels) that have to formulate waste policy and maintain regulations. Beside their viewpoints on the proposed adaptations to the structure of the waste sector and their estimation of the effects on solid waste flows in terms of quantity and quality, they were also asked for their opinions on changes in the structure of the Dutch waste sector since 1994, when the first phase of this research project was conducted.

Through this method of gathering information, interviewing key persons, and asking for written comments, it was possible to examine advantages and drawbacks of the suggested adaptations before drawing any final conclusions. Instead of ending our research project with only some conclusions based on the case studies, we wanted to do something extra. By confronting some representatives in the field with these preliminary conclusions, gathering their comments and useful suggestions, we hoped to show some of the nuances before formulating the final conclusions of the project.