The perceived quality of the urban residential environment
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Chapter 8
Overview and discussion

8.1 Introduction

The focus of the studies presented in this monograph was on the perceived quality of urban residential environments. This monograph is concluded with a discussion of several issues that have been raised in the preceding theoretical and empirical chapters. An overview of the research in this monograph is given in section 8.2. In section 8.3 the four research hypotheses presented in Chapter 2 are discussed in light of the results of the four empirical studies reported in Chapters 4 through 7. In section 8.4 the implications of the research results for the three different perspectives on environmental quality presented in Chapter 2 are discussed. The three perspectives were the policy maker's perspective, the theoretical perspective, and the empirical research perspective.

8.2 Overview of Chapters 1 through 7

In Chapter 1 the subject of this monograph was introduced: the perceived quality of the urban residential environment. It was concluded that assessment of the quality of urban residential environments is important because of their growing importance as the main habitat of people. Two types of methods for the assessment of environmental quality were distinguished: methods based on measurement of exposure levels of adverse conditions and methods based on the effects of exposure to adverse conditions. In this monograph an effect-based perspective on environmental quality is adopted. Relevant effect measures were residential satisfaction and annoyance.

In Chapter 2 the concept of environmental quality was discussed in light of three different perspectives: the environmental policy maker's perspective, a cognitive-psychological perspective, and an empirical research perspective. From the discussion of the policy maker's perspective several conclusions were drawn: (a) next to physical attributes, psycho-social attributes and attributes of the built environment are relevant attributes, (b) environmental quality may be seen as an hierarchical multi-attribute concept, and (c) policy makers tend to take an expert-based and exposure-based perspective on environmental quality, which is different from the view adopted in this monograph. On the basis of cognitive-psychological considerations it was concluded that it is worthwhile to study the effects of environmental attributes in relation to their sources (e.g., noise: noise by traffic, noise by neighbours, noise by industrial activity). The person-environment relationship is influenced by characteristics of the person, of the environment, and characteristics evolving from the interaction between a person and the environment. Hence, different sources of the same environmental attribute may be differently valued on the same characteristic. Finally, the overview of empirical research on residential satisfaction revealed (a) a list of possibly relevant quality attributes and (b) a number of personal characteristics that may possibly influence perceived environmental quality (e.g., age, gender, socio-economic status (SES)). Altogether, this led to the design of a theoretical model of perceived environmental quality (see Figure 2.1). This model served as a theoretical framework for the design of four empirical studies. On the basis of the discussion of the above three perspectives and the general research methodology (see below), four research hypotheses were formulated. These hypotheses are presented and discussed in section 8.3.

In Chapter 3 the general research methodology was presented: the multi-attribute evaluation of the perceived quality of urban residential environments. Multi-attribute evaluation involves the following steps: (a) the inventoring and structuring of
relevant attributes, (b) the evaluation of residential environments on the relevant attributes, and (c) the assessment of the relative importance of each attribute with respect to perceived environmental quality. Methods and techniques from behavioural decision theory were used to develop three different research approaches: the Hierarchical Multiple-Regression (‘HMR’) approach, the Multi-Attribute Utility (‘MAU’) approach, and the Conjoint Analysis (‘CA’) approach. The most important methodological difference between these approaches is the way in which the relative importance of attributes is assessed. This may be done constructively (as in the ‘MAU’ approach) or reconstructively (as in the ‘HMR’ and ‘CA’ approach).

In Chapter 4 environmental quality was analyzed following the ‘HMR’ approach. By means of written questionnaires, on-site residents in the city of Rotterdam were asked to evaluate their present residential situation on the various residential attributes in the theoretical model of environmental quality (Figure 4.1). Residents provided both general satisfaction evaluations and evaluations on specific residential attributes. Regressing the general satisfaction evaluations on the specific evaluations revealed a 'model fit', which appeared to be moderate (25%). Important attributes appeared to be noise, crowding, litter, and the presence of neighbourhood facilities. The effects of personal characteristics on perceived environmental quality appeared to be of minor importance. Subjective evaluations varied across neighbourhoods. Some of the observed differences among neighbourhoods in subjective quality judgments in the present study corresponded closely with differences between neighbourhoods as indicated by objective data from other studies.

In Chapter 5 environmental quality was evaluated following a ‘MAU’ approach. In face-to-face interviews, residents were presented with a list of possibly relevant attributes. They were then asked to select important residential attributes, to structure these attributes according to their 'similarity', and finally to rank-order and rate these attributes according to their importance for environmental quality. From the residents' responses several measures for attribute importance were obtained (relative frequencies and standardized weights based on rankings and ratings), which appeared to correlate highly. The individually obtained attribute structures were aggregated across residents, which resulted in an empirical model of environmental quality. The resemblance between the theoretical and empirical model with respect to both structure and contents was found to be fairly high. Important residential attributes appeared to be: noise by neighbours, rent or mortgage of the dwelling, indoor- and outdoor facilities, spacious rooms, crime-related attributes, social contacts, neighbourhood facilities, and upkeep of the neighbourhood. Personal characteristics were not found to significantly influence the relative importance of the residential attributes.

In Chapter 6 a study is described which was a replication of the previous study in as far as the research methodology (‘MAU’ approach) was concerned. In this study, however, the respondents were so-called 'experts'. Experts were all municipal civil servants occupied in various fields (e.g., law enforcement, community health, social security). Their task or a part of their task was municipal policy advisement and/or municipal management. The results showed a high degree of correspondence between experts' and residents' evaluations of environmental quality. The similarities between the environmental quality models of the two groups on the basis of the individual structuring of attributes were striking. The relative importance of the residential attributes as assessed by 'experts' and residents corresponded strongly.

Finally, in Chapter 7 the concept of environmental quality is examined following a Conjoint Analysis (‘CA’) approach. This time, in face-to-face interviews, residents were presented with descriptions of dwellings and neighbourhoods and some
of their underlying relevant attributes, so-called 'profiles'. The subjective values (levels) of these attributes were prespecified, systematically varied, and combined by the researcher using an experimental design, which allowed for determining afterwards their relative importance. Residents only provided overall evaluations (preference rankings) of the various descriptions. Relating these overall evaluations to the predetermined values of the constituting residential attributes resulted in their relative importance. Important residential attributes appeared to be: the indoor climate, the level of upkeep, and size and facilities of the dwelling; safety/deterioration, social ties in the neighbourhood, and noise. The relationship between the relative importance of the dwelling and neighbourhood attributes obtained in the 'MAU' approach and in the 'CA' approach was low to moderately strong. The extent of the model fit of the empirical model (Figure 5.1) was comparable to the one obtained by the theoretical model (Figure 2.1).

8.3 Discussion of the research hypotheses
Based on the discussion of the three perspectives in Chapter 2 (the policy maker's, the theoretical, and the empirical perspective) and the general research methodology described in Chapter 3, four research hypotheses were formulated (see section 2.6):

Hypothesis 1: The 'perceived quality of the urban residential environment' can be usefully considered to be a hierarchical multi-attribute concept.

Hypothesis 2: Urban environmental quality does not only depend on physical environmental attributes (e.g., noise, malodour, air pollution) but also on various other types of environmental attributes, e.g., psycho-social attributes and attributes of the built environment.

Hypothesis 3: Experts' perceptions of environmental quality differ from residents' perceptions of environmental quality with respect to relevant environmental attributes, the cognitive representation of the concept, and the relative importance of attributes of environment quality.

Hypothesis 4: Behavioral decision theory provides a fruitful methodological framework for modelling the perceived quality of the urban residential environment. Applying different decision-theoretical methods and techniques to study the concept of environmental quality will lead to comparable results. These results may be used for the development of a tool that is capable of assessing perceived environmental quality.

In the following sections each of the research hypotheses is discussed in light of the results of the research presented in this monograph. The implications of the results of the four empirical studies for environmental policy, theory and (future) empirical research are presented in section 8.4.

Hypothesis 1: The 'perceived quality of the urban residential environment' can be usefully considered to be a hierarchical multi-attribute concept.

The first relevant issue with respect to the multi-attribute nature of perceived environmental quality was: what attributes are possibly relevant with respect to
perceived environmental quality? In the 'HMR' study (Chapter 4) relevant residential attributes were inventoried by the researcher on the basis of a literature study. By means of a questionnaire, residents were asked to name additional attributes, not mentioned in the questionnaire. This resulted in only a few additional attributes. From this study it was concluded that the attributes represented in the theoretical model of environmental quality were a fairly good account of the relevant attributes. In the 'MAU' study, (Chapter 5) respondents started by naming all relevant environmental attributes. This time respondents stated more additional attributes, that is, attributes not already on the list (Appendix B1), for instance, insulation of the dwelling or variety in residents and dwellings in the neighbourhood. However, a majority of the respondents acknowledged that the list of residential attributes they were presented with was a good account of the relevant attributes. This led to the conclusion that almost all relevant residential quality attributes had been considered for evaluating environmental quality (see Appendix B1). Thus it may be concluded that environmental quality truly is a multi-attribute concept.
The second issue relevant to the first research hypothesis is the residents'...
cognitive representation of the concept of environmental quality. In the 'MAU' study (Chapter 5) residents were asked to construct the concept of environmental quality from underlying relevant attributes. Aggregated across residents, these individual 'models' resulted in the empirical model of environmental quality depicted in Figure 8.1 (same as in Figure 5.1). Although some differences could be observed, it was concluded that the correspondence between the empirical model (based on the responses of the residents) and the theoretical model (developed by the researcher) was reasonably high. The above indicates that perceived environmental quality may best be seen as a hierarchical multi-attribute concept. The resulting empirical model is an accurate and adequate way of representing residents' cognitive representation of environmental quality.

The final issue to be addressed in this section is the relative importance of the residential quality attributes. In three studies, residents were asked to evaluate the relative importance (weight) of various residential attributes. In the 'HMR' study weights were defined as the relative contribution of the evaluations of residential attributes to the observed variance in higher-level attributes. The relative contribution was given by the standardized regression coefficient (beta). In the 'MAU' study residents evaluated relative importance directly by rating the residential attributes with respect to importance for environmental quality. This was done irrespective of the present

### Table 8.1 Overview of the most important quality aspects of dwellings and neighbourhoods according to three different assessment methods.

<table>
<thead>
<tr>
<th>Dwelling attributes</th>
<th>HMR</th>
<th>MAU*</th>
<th>CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>facilities</td>
<td></td>
<td>rent or mortgage</td>
<td>outdoor upkeep</td>
</tr>
<tr>
<td>upkeep</td>
<td></td>
<td>indoor facilities</td>
<td>mould/vermin</td>
</tr>
<tr>
<td>costs</td>
<td></td>
<td>spacious rooms</td>
<td>malodour</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Neighbourhood attributes</th>
<th>HMR*</th>
<th>MAU**</th>
<th>CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-greeneries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-schools</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-illuminations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>crowding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-busy streets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-unfamiliar faces</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-number of people</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>noise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-cars/mopeds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-neighbours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-buses etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>litter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-garbage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-demolition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-unaesthetic buildings</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note*: Recall, from Chapter 4, that the importance weights of attributes obtained in the 'HMR' study can only be compared between attributes belonging to one and the same higher-level neighborhood aspect. The list of most important neighborhood attributes therefore is nested. Firstly, the most important higher-level neighborhood attributes are presented, secondly, the most important attributes within a higher-level attributes are rank-ordered.

Note**: Presentation of most important residential attributes is based on the study conducted among residents (see Chapter 5).
residential situation. In the 'CA' study overall evaluations of different experimentally
designed profiles of residential situations were used to assess the relative importance of
residential attributes. In Table 8.1 an overview of the most important dwelling and
neighbourhood attributes according to the three different assessments methods is given
(cf. Chapter 4, section 4.4, and Tables 5.14 and 7.8). Attributes are presented in
descending order of weight magnitude.

One conclusion that may be drawn from Table 8.1 in light of the first
hypothesis is that perceived environmental quality is determined by various different
residential attributes. In general, important dwelling attributes are costs (costs of
upkeep, rent or mortgage), upkeep (indoor and outdoor), facilities (indoor, outdoor),
indoor climate (noise, presence of mould/vermin), and size (spacious rooms). Relevant
neighbourhood attributes are as diverse as facilities (e.g., schools, greenery,
ilumination at night, public transportation, shops), (social) safety risks (e.g., burglary,
vandalism, junkies, hold-ups, traffic), social ties in the neighbourhood, environmental pollution (e.g., noise, soil pollution), aesthetics/littering (garbage, demolition, uneaesthetic and abandoned buildings, upkeep), and crowding (e.g., number of people in the neighbourhood, busy streets).

In Chapter 3 it was concluded that none of the three different approaches was best or worst on all the steps of a multi-attribute evaluation (see section 3.5). Based on that conclusion, the above overview of important attributes may be seen as a general result according to the three research approaches (the 'HMR', the 'MAU', and the 'CA' approach). However, in the empirical chapters several shortcomings with respect to the three different research approaches have been discussed. The weight estimation of the residential attributes constituted a particular problem. In the 'HMR' approach weight estimation was possibly troubled by multicollinearity between the independent variables in a multiple regression analysis (see section 4.4, under Fitting the model). Attribute weights assessed in the 'CA' approach were somewhat biased due to the design of some of the residential profiles used in the 'CA' experiment. Due to the differing number of attributes in some profiles, some of the attribute weights obtained may have been overestimated (see section 7.4, under Correspondence). Attribute weight estimation according to the 'MAU' approach was also not without trouble because of the assumption that, at an individual level, attributes evaluated as unimportant consequently received a relative weight of zero. However, as discussed before this probably did not influence the magnitude of the attribute weights to a large extent. On the basis of these considerations it is concluded that of the three multi-attribute evaluation procedures, the results of the MAU-approach appear to be the most proper ones.

Finally, safety-related attributes are considered to be relatively important attributes according to both the results of the 'MAU' and the 'CA' approach (middle- and rightmost panel in Table 8.1) but not according to the results of the 'HMR' approach (leftmost panel in Table 8.1), which is remarkable. The aforementioned 'multicollinearity' between independent variables may explain the absence of safety risks-related attributes in the list of important attributes according to the 'HMR' approach.

Conclusion on hypothesis 1. Altogether, it may be concluded that environmental quality may best be seen as a hierarchical multi-attribute concept. It is influenced by various different types of residential attributes. Also, these residential attributes may best be structured in a hierarchical way. The perceived quality of dwellings is determined by attributes pertaining to costs, indoor climate, size and facilities of the dwelling. The perceived quality of neighbourhoods is determined by neighbourhood attributes as various as safety-related attributes, facilities in the neighbourhood, litter/aesthetic attributes, social interactions, crowding, and environmental pollution. On the basis of the present methodological shortcomings of the 'HMR' approach and the 'CA' approach, the 'MAU' approach is advocated for evaluating perceived environmental quality.

Hypothesis 2: Urban environmental quality does not only depend on 'pollution'-type of environmental attributes (e.g., noise, malodour, air pollution) but also on various other types of environmental attributes, e.g., psycho-social attributes and attributes of the built environment.

According to the Dutch National Environmental Policy Plan (NEPP; VROM 1988/89) the quality of the residential environment is mainly determined by the presence of pollution-type or physical attributes. In the 'HMR' study the focus was mainly on
attributes underlying the neighbourhood. As can be noted from Table 8.1 only attributes pertaining to noise in the neighbourhood were considered relatively important physical attributes by the residents. The importance of other physical attributes such as annoyance by malodour or pollution (air, soil, water) was relatively low. Other important neighbourhood attributes were psycho-social attributes (crowding) and attributes of the built environment (facilities). The residents' cognitive structure of perceived environmental quality, represented by the empirical model ('MAU' study, Chapter 5), also indicated a minor role for attributes like malodour, litter, and pollution. In the residents' perception these attributes all belonged to one unifying residential attribute, labelled as 'environmental hygiene'. Here, one of the observed differences between the empirical model and the theoretical model could be noted. In the theoretical model the neighbourhood attributes malodour, litter and pollution were conceived of as distinct neighbourhood attributes. Finally, in the 'CA' study the difference in importance of the higher-level neighbourhood attributes could be quantified. The study revealed that 'environmental hygiene' (relative weight: .12) was regarded as less important than 'safety/deterioration' (.25), 'social ties' (.16), 'noise' (.15), and 'accessibility' (.13), but more important than 'facilities' (.11) and 'buildings/space' (.09).

In the 'MAU' study dwelling attributes were evaluated in more detail. From the empirical model a group of indoor 'environmental attributes' emerged, containing attributes such as noise, malodour, air pollution, and the presence of mould or vermin (labelled: 'indoor climate'). Some of these adverse conditions may result from attributes mentioned in the NEPP, for instance, volatile organic compounds (VOC), environmental tobacco smoke (ETS), and humidity. Furthermore, from the results of the 'CA' study it appeared that 'indoor climate' (relative weight: .26) was considered to be the most important dwelling attribute. Another important attribute was the dwelling's 'upkeep' (.23), followed by size/facilities (.18), 'costs' (.17), and 'outdoor facilities' (.15).

Conclusion on hypothesis 2. Altogether, it may be concluded that the importance of the mainly physical attributes with respect to environmental quality varies. For the perceived quality of dwellings physical attributes are relatively important quality attributes whereas for the perceived quality of neighbourhoods other attributes appeared to be more important. Only noise appeared to be a relatively important physical attribute for the quality of both dwellings and neighbourhoods.

Hypothesis 3: Experts' perceptions of environmental quality differ from residents' perceptions of environmental quality with respect to relevant environmental attributes, the cognitive representation of the concept, and the relative importance of attributes of environmental quality.

Unexpectedly, the results of the 'MAU' study conducted under twenty municipal civil servants ('experts'), revealed a close correspondence between experts and residents in their evaluation of environmental attributes. From the five most important dwelling attributes experts and residents had four in common. They shared seven out of the ten most important dwelling attributes. They agreed to a large extent upon both the relative importance of the dwelling attributes and that of the neighbourhood attributes (correlations: .77 and .80, respectively). Finally, both groups' cognitive representation of the concept of environmental quality was fairly alike. It should be noted that these findings are based upon the results of responses which were aggregated across residents and experts. The results do not necessarily apply to individual residents' or experts' perceptions of environmental quality.

The multi-attribute evaluation procedure incorporated five steps (cf. Chapter 3), three of which were used to analyze perceived environmental quality. On two of
these (attribute inventory and structuring (step 1) and attribute weight assignment (step 3)) the results between both groups corresponded fairly well. Data on the evaluation (step 2) of residential situations with respect to the relevant residential attributes were not collected, so on this point no comparison could be made. It would, however, be interesting to assess the degree of correspondence between on-site residents' and experts' multi-attribute evaluations of actual residential situations. The observed low correspondences between residents and experts reported in the studies discussed in Chapter 2 may originate from differences in the actual evaluation of residential sites.

Conclusion on hypothesis 3. Altogether, it may be concluded that with respect to the relevant attributes, their hierarchical structure, and their relative importance both experts and residents agree to a large extent. With respect to these issues hypothesis 3 may be rejected. The extent to which residents and experts agree on the evaluation of actual residential situations, however, remains unclear.

Hypothesis 4: Behavioral decision theory provides a fruitful methodological framework for modelling the perceived quality of the urban residential environment. Applying different decision-theoretical methods and techniques to study the concept of environmental quality will lead to comparable results. These results may be used for the development of a tool that is capable of assessing perceived environmental quality.

In Chapter 3 a multi-attribute evaluation procedure was developed on the basis of methods and techniques from behavioral decision theory. This procedure included five steps. Three of these five steps were explicitly used to analyze environmental quality in the studies presented in this monograph: the inventorying and structuring of attributes (step 1), evaluation of objects on the relevant attributes (step 2), and attribute weight assessment (step 3). For steps 1 and 3, different research approaches were used (see below). The convergence between different approaches is indicative for the robustness of the research results obtained in the empirical studies.

Two different approaches to structure residential attributes (step 1) have been presented: the top-down approach and the bottom-up approach. In the 'top-down' approach an abstract, top-level value-relevant attribute is split up into more specific lower-level attributes (e.g., environmental quality into satisfaction with the dwelling, the neighbourhood, and the neighbours). The specification of attributes is continued until the attributes reach a level of concreteness such that the objects can be validly measured on these attributes. On the other hand, the bottom-up approach amounts to a synthesis of well-specified, concrete attributes. Specific attributes are combined into groups so as to yield fewer but more general attributes. In turn, these higher-level attributes are grouped together. This may continue until only one attribute remains, the 'top-level' attribute. Both procedures result in a so-called value tree of attributes.

The top-down approach was applied by the investigator. On the basis of an inventory of the literature on environmental quality (see Chapter 2) possibly relevant attributes were hierarchically structured. This resulted in the theoretical model of environmental quality depicted in Figure 2.1. The bottom-up approach was employed in one of the studies among residents (see Chapter 5). On the basis of a list of residential attributes, provided by the researcher and, if considered necessary, completed by the respondents, respondents individually structured the attributes. Aggregated across respondents these value trees resulted in the empirical model of environmental quality presented in Figure 5.1 (see also Figure 8.1). Two different ways to inventory and structure attributes performed by two different analysts (researcher and group of residents) resulted (a) in an adequate overview of residential quality attributes, that is, a
list in which all relevant residential attributes are present (see Appendix B1) and (b) in two fairly similar models of perceived urban environmental quality. One may conclude from the observed convergence between different methods to inventory and structure residential attributes that the results obtained in step 1 in the multi-attribute evaluation procedure are fairly robust.

The main research aim was to assess the relative importance (weights) of relevant residential attributes. The residents’ preference structure for residential attributes was modelled constructively (in a 'MAU' approach) and reconstructively (in the 'HMR' and 'CA' approaches). In the constructive modelling approach 'environmental quality' was 'built up' from its underlying attributes. The relative importance of the underlying attributes was estimated directly. On the other hand, in the 'reconstructive' modelling approach, overall preference, by judgements, for an object is 'broken down' to yield the relative importance of the underlying attributes. In both modelling approaches standardized attribute weights were obtained. The averaged attribute weights across residents according to the 'MAU' approach and the CA-approach for dwelling attributes (see Tables 5.5 and 7.3) and neighbourhood attributes (see Tables 5.10 and 7.4) were compared. The strength of the relationship between the results of the constructive (MAU) and reconstructive (CA) modelling approach for dwelling attributes appeared to be moderate (correlation: .31). The correspondence between the two weight vectors for neighbourhood attributes appeared to be reasonably strong (correlation: .64). It may be concluded on the basis of the observed association between the results of the constructive and reconstructive modelling approaches that the convergence of both approaches is altogether moderate. Solving the methodological shortcomings discussed in section 7.4, i.e., balancing the number of attributes in the profiles of the 'CA' experiment and using equal numbers of attributes to evaluate, may increase the observed correspondence between the two modelling approaches.

Conclusion on Hypothesis 4. Altogether it may be concluded that the proposed multi-attribute evaluation of perceived environmental quality is an adequate way of modelling this concept. The proposed multi-attribute evaluation procedures led to fairly robust results with respect to the relevant residential attributes and their (hierarchical) structure. The robustness of the assessed relative weights of residential attributes is still a matter of debate.

Additional issues

In the empirical studies four additional issues have been addressed. Firstly, in three studies residents were asked about their evaluative opinions on their present residential situation. Secondly, the extent to which residents' evaluations of lower-level attributes accurately predicted their higher-level attribute evaluations was assessed. This has been referred to as the 'model fit'. Thirdly, the influence of personal characteristics on environmental quality and attribute weight assignment has been studied. Finally, some methodological issues concerning the assessment of annoyance have been examined.

Evaluation of the present residential situation. Residents evaluated their present residential situation on the attributes in the theoretical model (see Chapters 4 and 5) and in the empirical model (Chapter 7). Residents provided both evaluations on lower-level, specific residential attributes and overall evaluations. In general, residents appeared to be fairly satisfied with their present residential situation. In all three studies the average residential satisfaction score was 2.7, which is close to the mid-point of the evaluation scale (range: 1 - 5; higher values indicating more dissatisfaction or annoyance). Residents appeared to be reasonably satisfied with their present dwelling
and neighbourhood. In general, they were more satisfied with their present dwelling than they were with their present neighbourhood. The most dissatisfying dwelling attributes, across the three studies, appeared to be the level of upkeep and the costs of the dwelling. Safety risks and environmental hygiene (including noise) appeared to be the most annoying dwelling attributes. Note that there may be a difference between the relative importance of an attribute for an object and the object score on that attribute. For instance 'environmental hygiene' was considered to be a relatively unimportant dwelling attribute. On the other hand, the residents' neighbourhood scores on 'environmental hygiene' revealed relatively high levels of annoyance. From this it may be inferred that although residents are annoyed by the environmental hygiene of their neighbourhood, 'environmental hygiene' is also considered to be relatively unimportant for their overall sense of environmental quality.

It also may be concluded, from the results of the 'HMR' study (Chapter 4), that the respondents' evaluations were in agreement with the ambient conditions, at least for some of the attributes in the theoretical model. The residents' evaluations were compared with 'objective' neighbourhood data, obtained from 'REBUS' (see Chapter 4, section 4.3.5). The results showed that the residents' evaluations on the residential attributes - aggregated across neighbourhoods - were a fairly adequate reflection of the ambient condition of the residential environment (cf. Table 4.8).

Another interesting observation from the 'HMR' study pertains to the differences in evaluations of residential attributes between neighbourhoods. As can be seen from Table 4.4 the ranking of neighbourhoods on the basis of averaged satisfaction scores differs for different dwelling and neighbourhood attributes. What may seem a less annoying or dissatisfying attribute in one neighbourhood appears to be the most annoying or dissatisfying attribute in another neighbourhood. Altogether, the pattern is that respondents in high-SES neighbourhoods are inclined to express more satisfaction than those in low- and medium-SES neighbourhoods. Below, the implications of this observation are discussed at greater length.

In conclusion: It may be stated that residents are fairly satisfied with their dwelling and the neighbourhood they live in. At a neighbourhood level it appears that satisfaction with residential attributes is differently valued for different neighbourhoods.

Model fit. The evaluations of their present residential situation provided by the residents were used in several hierarchical multiple regression analyses to assess the extent of the model fit. Although the model of environmental quality is appropriate as a conceptual model, its appropriateness as an operational model is, as yet, unclear. The model fit of the theoretical model was assessed twice (Chapters 4 and 5) and the model fit of the empirical model was assessed once (Chapter 7). The extent to which variations in perceived environmental quality could be explained by the residents' evaluations of the lower-level residential attributes appeared to be relatively low on all three occasions (R²: .25, .34, .22, respectively, cf. Figures 4.2, 5.3, and 7.3). One might be tempted to conclude that the model of environmental quality as an explanatory instrument is inappropriate. However, as was demonstrated, (a) the relevant residential attributes are fully captured by the model and (b) the theoretical and empirical models' structure are reasonably alike, both indicating that the model is adequate with respect to attribute contents and structure. Furthermore, going from top to bottom in the models, the explanatory power of both models increases (cf. Tables 4.6 and 7.8). In parallel the models' attributes become more specified, less abstract. As was argued before, environmental quality is a complex and abstract concept. The residents' overall assessments of environmental quality therefore may contain a relatively high proportion of error variance. The relatively low model fit may increase with more reliable
assessments of environmental quality, for instance interval or ratio estimations (see Chapter 3).

In conclusion: the developed model of perceived environmental quality appears to be an appropriate model both in a conceptual and in an operational sense. The low predictive power of the model may increase by using more refined elicitation techniques to assess overall perceived environmental quality.

Personal characteristics. Several personal characteristics have been studied to assess their influence on perceived environmental quality and attribute weight magnitude. The most important characteristics studied were: age, gender and socio-economic status (SES). Additional variables were: city, subjective health, and homeownership. In general the influence of personal characteristics on perceived environmental quality appeared to be very small.

In the three studies among residents (Chapters 4, 5, and 7) the influence of personal and household characteristics on perceived environmental quality was assessed. In general, it was found that some of the characteristics studied affected perceived environmental quality, but did so very moderately. Age, SES, and homeownership were found to affect perceived environmental quality. In general, older people were more satisfied with their present residential situation than younger people, residents high in SES were more satisfied than residents low in SES, and, finally, homeowners appeared to be more satisfied than tenants. But, as already stated above the influence of these variables on perceived environmental quality was modest.

In the 'MAU' study (Chapter 5) and the 'CA' study (Chapter 6) the influence of city, age, gender and SES on attribute weight magnitude was assessed. No significant main effects of these demographic characteristics on the magnitude of the attribute weights could be detected.

In conclusion: The influence of personal characteristics such as age, gender, SES, subjective health, and homeownership on perceived environmental quality is low. The influence of the demographic characteristics studied on attribute weight magnitude is negligible.

Methodological issues: Estimation method for annoyance. In the theoretical chapter (Chapter 2) annoyance was interpreted as a multi-dimensional concept. Annoyance by any source was determined by several characteristics such as frequency of occurrence of a source and its intensity. On the basis of these two dimensions an indirect assessment measure for annoyance was defined: annoyance is the product of the frequency and the intensity scores of a given source. Also, a direct estimate of annoyance was used. Annoyance by a given source was defined as its score on a 5-point scale. In the 'HMR' study (Chapter 4) indirect and direct estimates of annoyance were collected and compared. It appeared that the correspondence between the two measures was high (range of correlations for sets of annoyance items: .59 - .86, cf. Table 4.7).

In conclusion: Annoyance by various environmental sources may be reliably measured by direct assessments. These may replace the more laborious indirect annoyance assessments as measures of annoyance.

Methodological issues: Weight estimation methods. To assess the relative weights of the residential attributes three different importance measures were employed in the 'MAU' study (Chapter 5): dichotomous importance selections of attributes (important-unimportant), rankings, and interval ratings. The dichotomous importance selections were used as a basis for attribute weight measurement at group level. This was done by calculating for each attribute the number of times (relative frequency) it was considered important by the respondents. Rankings and ratings were transformed
into standardized attribute ratings, referred to as weights. Usually, ratings are used to assess relative attribute weights. However, obtaining attribute ratings is a relatively time-consuming and laborious procedure. Obtaining rankings and transforming these into interval scale weights is a relatively easy method to assess weight estimates at an individual level. Comparison of the results revealed that the correspondence among the different assessments methods was high to very high (range of pairwise correlations: .76 -.95, cf. Tables 5.7 and 5.12).

In conclusion: Estimating relative attribute weights at group level or at an individual level, by obtaining relative frequencies or rankings, respectively, provides results which are highly comparable to the results obtained by ratings. In addition, obtaining relative frequencies or rankings is an easier-to-apply assessment method than is the rating method.

Methodological issues: Simulation. Finally, in the 'CA' study (Chapter 7) residents were asked to evaluate experimentally designed residential situations. These artificial residential environments were represented by means of verbal descriptions. Obviously, representing residential situations in such a way is quite different from experiencing real residential environments. This may influence the validity of the weight assessments negatively. Nevertheless, the results of the analysis of the hold-out profiles (see Chapter 7, section 7.2.2) revealed that residents were able to rank-order the quality profiles with a high degree of reliability. So, respondents are able to evaluate differences in perceived environmental quality reliably on the basis of written descriptions of such complex situations as residential environments. Therefore this method may provide a tool for simulation purposes. This topic is discussed further below.

8.4 Implications for environmental policy, theory and empirical research

In the above sections the results of the four empirical studies have been discussed in light of the four research hypotheses postulated in Chapter 2. In Chapter 2 the concept of urban environmental quality was elaborated from three different perspectives: the policy maker's perspective, a cognitive-psychological perspective, and the empirical research perspective. In this section the implications of the results are discussed in view of these three perspectives.

8.4.1 Implications for environmental policy

The Dutch environmental policy goal for the local area amounts to achieving and maintaining a good quality of the residential environment. According to the NEPP, this may best be achieved by reducing the number of people exposed to several physical residential attributes (e.g., noise, malodour, (indoor) air pollution, and external safety risks). The results of the empirical studies presented in this monograph indicate that this approach is one-sided and limited. According to the residents' responses, next to these physical attributes, other attributes are (also) important for the quality of the urban residential environment. This calls for an integrated environmental policy for the local area. As is visualized in Figures 2.1 and 5.1, next to physical attributes psycho-social attributes such as social safety risks and community attributes, but also attributes of the built environment such as facilities and aesthetic attributes should be considered in environmental policy plans for the residential environment. Furthermore, the results indicated that the relative importance of most of the physical attributes is relatively low compared to that of the psycho-social attributes and attributes of the built environment.
environment. It should be noted that this is only applicable for the set of residential quality attributes that was actually studied (see Appendix B), and for the range of quality variations studied. But, as indicated before, it appears that the set of quality attributes is considered, by the respondents, to be a complete and adequate representation of relevant residential quality attributes.

In conclusion: Environmental policy for the local area should be an integrated policy in which next to physical attributes also psycho-social attributes and attributes of the built environment should be considered. This perspective is represented in the models of environmental quality presented in Figures 2.1 and 5.1.

Recall that the spatial level at which the above Dutch policy intentions are defined is the local level, which comprises people's dwellings and neighbourhoods in cities and villages. In Chapter 1 of this monograph this spatial level was narrowed down to urban residential environments. As the results indicated, residents are fairly satisfied with the quality of their present residential situation. It also became apparent that residents in different neighbourhoods were differently (dis)satisfied with underlying dwelling and neighbourhood attributes. This indicates that environmental policy at the local level should be differentiated, that is, assessments of environmental quality should be made at least at a neighbourhood level. The neighbourhood level at which environmental quality was assessed in the preceding studies resulted from a more or less arbitrary choice (postal codes). Nevertheless, even at the spatial level of neighbourhoods differences in both objective and subjective neighbourhood quality assessments could be observed between neighbourhoods. Also, for some quality attributes a moderate to high correspondence between objective data and subjective evaluations could be observed at an aggregated (neighbourhood) level. Although, at this moment, no data are available to corroborate this, perhaps even lower-level assessments may be necessary, that is, there may be observable differences in (perceived) environmental quality between different sections in the same neighbourhood.

In conclusion: At this point it can be said that the neighbourhood level is a valid aggregation level for the assessment of perceived environmental quality. Therefore an adequate environmental policy for the local area should be differentiated and defined at least at the level of neighbourhoods. This means that assessments of residents' quality evaluations of residential environments should be made (a) on the various different important residential attributes as identified before (see above) and (b) that these evaluations should be analyzed and interpreted at a neighbourhood level, not at the level of the city or village.

For the categories of age, city, gender or SES no observable differences could be found with respect to the preference structure of residential quality attributes, i.e., the importance ranking of relevant attributes. This means that the set of relevant residential quality attributes is largely the same for different categories of age, city, gender or SES.

In conclusion: The environmental policy plans for urban residential environments need not be differentiated with respect to the relevant residential attributes for these demographic variables.

In Chapter 2 it was argued that Dutch environmental policy is an expert-based policy. This means that environmental quality criteria, evaluation of sites on these criteria, and the decisions resulting from these evaluations are mainly performed by experts (e.g., environmental scientists, legislative municipal civil servants, or managers).
From the literature it was concluded that the correlation between experts' and residents' evaluations was rather low. Contrary to the conclusions drawn from the literature, experts in the present study, in casu, municipal policy advisors and managers, appear to have a good understanding of the residents' perceptions of environmental quality, at least when considered at group level. In addition it was concluded that the MAU-approach, compared to the other two approaches employed, appeared to be the most proper multi-attribute evaluation procedure to analyze environmental quality. The above indicates that the research protocol used in the MAU-approach of environmental quality (see Chapters 5 and 6) may be used as an environmental policy tool to analyze and define perceived environmental quality in the urban residential area.

A proposal for a policy procedure is schematically presented in Box 8.1.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Specification of procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Definition of evaluation concept and objects:</td>
<td>- Urban environmental quality and residential situations (dwellings and neighbourhoods).</td>
</tr>
<tr>
<td>- Decision:</td>
<td>- in case of 'normal' situation (residential environments, population, time-frame): use empirical model and obtained weight vectors according to MAU-approach (Chapter 5), go to 'Evaluation of perceived environmental quality (left panel), - if else: perform multi-attribute evaluation procedure.</td>
</tr>
<tr>
<td>- Multi-attribute evaluation procedure:</td>
<td></td>
</tr>
<tr>
<td>- Identifying 'judges':</td>
<td>- Municipal policy advisors and managers from different policy fields.</td>
</tr>
<tr>
<td>- Multi-attribute evaluation:</td>
<td>- MAU-approach similar to procedure described in Chapters 5 and 6:</td>
</tr>
<tr>
<td></td>
<td>- inventory of relevant attributes.</td>
</tr>
<tr>
<td></td>
<td>- hierarchical structuring of attributes (bottom-up approach) with similarity as grouping criterion.</td>
</tr>
<tr>
<td></td>
<td>- ranking of attributes.</td>
</tr>
<tr>
<td>- Analysis:</td>
<td>- Cluster analysis (relative incidence of importance and agglomerative hierarchical clustering).</td>
</tr>
<tr>
<td></td>
<td>- Weight calculation of attributes (rank-reciprocal rule).</td>
</tr>
<tr>
<td>- Report:</td>
<td>- Conceptual hierarchical model of environmental quality containing relevant residential quality attributes.</td>
</tr>
<tr>
<td></td>
<td>- Overview of the (most) important residential attributes.</td>
</tr>
<tr>
<td>- Evaluation of perceived environmental quality.</td>
<td></td>
</tr>
<tr>
<td>- by whom:</td>
<td>- (on-site) Residents.</td>
</tr>
<tr>
<td>- tools:</td>
<td>- Questionnaires or face-to-face interviews on the basis of the conceptual model and important residential attributes obtained above.</td>
</tr>
<tr>
<td>- spatial aggregation level:</td>
<td>- At least disaggregated at neighbourhood level.</td>
</tr>
<tr>
<td>- presentation:</td>
<td>- Bar-charts (overview of relevant attributes per neighbourhood), - Perceived Environmental Quality Index (PEQI) to compare neighbourhoods.</td>
</tr>
<tr>
<td>- Feed-back of results:</td>
<td>- To inventory environmental problems in existing residential situations.</td>
</tr>
<tr>
<td></td>
<td>- To serve as criteria for establishing/controlling physically-based Environmental Quality (EQ) indices.</td>
</tr>
<tr>
<td></td>
<td>- To gauge the effect of implemented policy measures.</td>
</tr>
<tr>
<td></td>
<td>- To monitor perceived EQ over periods of time.</td>
</tr>
</tbody>
</table>

Box 8.1 Proposal for a policy procedure to evaluate the perceived quality of the urban residential environment.

The procedure starts with the definition of the evaluation concept and objects: urban environmental quality and dwellings and neighbourhoods. Next, a decision has to be made on whether a multi-attribute evaluation should be performed or whether the
model and the weight vectors obtained in the study presented in Chapter 5 are applicable. If there are no peculiarities with respect to the quality range of the residential environments under consideration, the composition of their population, or the time-frame within which the evaluation is performed, the empirical model and the weight vectors previously obtained may be used (see Chapter 5). If not, a multi-attribute evaluation procedure should be performed. The multi-attribute evaluation procedure starts with the identification of the judges. The judges to analyze the concept and the objects are municipal policy advisors and managers (experts, cf. Chapter 6), preferably from different policy fields, e.g., law-enforcement, municipal health service, social security, and environmental protection. In a face-to-face interview trial of about 20 'experts', these experts perform a multi-attribute evaluation of environmental quality following the 'MAU' approach (see Chapters 5 and 6). They thus make an inventory of all relevant attributes underlying environmental quality. They structure attributes according to the bottom-up approach with similarity among attributes as a grouping criterion. Finally, they rank order the attributes defined at the various levels. To analyze the experts' responses (grouping data) two cluster-analysis techniques may be used (relative incidence of importance and agglomerative hierarchical clustering). The results may lead to a conceptual hierarchical model of environmental quality. The nested rank-reciprocal rule may be used to calculate relative importance weights based on the experts' rankings of the attributes. This may result in attribute weight vectors. Altogether, this may result in a report in which a model of environmental quality and an overview of the (most) important residential attributes is presented. This may be either the existing model of environmental quality (Chapter 5) or the newly developed one. This report forms the basis for the evaluation of perceived environmental quality. The evaluation is performed by (on-site) residents. By means of a written questionnaire or in face-to-face interviews they are presented with the relevant (important) attributes. They are asked to evaluate their present residential situation with regard to the residential attributes presented. At a spatial level the residents' evaluations are analyzed at least at a neighbourhood level. The residents' evaluations of their residential situation may be presented in bar-charts for an easy overview of the relevant residential attributes per neighbourhood. For a quick comparison of the perceived environmental quality across neighbourhoods the attribute-wise evaluations may be aggregated into a Perceived Environmental Quality Index. This may be done by using a weighted-additive aggregation rule. The results may be used to inventory environmental problems in existing residential situations, to serve as criteria for establishing or controlling physically-based Environmental Quality Indices (EQIs), to gauge the effects of implemented policy measures, or to monitor perceived environmental quality over periods of time.

Finally, although the representation of residential situations on written cards is far from an ideal situation, the high degree of reliability with which respondents evaluated these descriptions offers possibilities. In existing residential situations, the impact of intended policy measures may be assessed by means of simulations. The approach may be similar to the one used in the Conjoint Analysis approach (Chapter 7). The intended policy measures may be translated into actual changes in the residential situations under consideration. These changes may be varied systematically. In a Conjoint Analysis experiment these different residential situations along with the existing situation could be submitted to a panel of residents for evaluation according to their attractiveness. The analysis should reveal the relative importance of the intended changes (less or more important) relative to the existing situation. For instance, a city council may want to improve the accessibility of the city centre. Therefore, the council
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... introduces several measures, i.e., a car-free zone and a new public transportation system for the city centre. Several scenarios may be available. In a Conjoint Analysis experiment the various scenario's may be simulated along with the existing situation. Next, residents or customers may be presented with the various scenarios. The results of the evaluation may reveal which combinations of measures are most preferable to the residents or customers. In this way, by means of experimental simulation, valuable and reliable information can be gathered to gauge the impact of intended policy measures.

In conclusion: The multi-attribute evaluation procedures presented in the previous studies may be used as a policy instrument for the analysis of perceived environmental quality and to evaluate environmental policy measures in advance.

8.4.2 Theoretical implications

In this monograph studies have been presented that dealt with the perceived quality of urban residential environments. It must be noted that the information on and the evaluation of residential environments came from studies of residential environments in modern, western societies. Of course one must be careful in generalizing the results of the presented studies to other cities in The Netherlands or other western countries. The problem of generalizing the results becomes quickly apparent when one looks at studies on environmental quality attributes in African or Asian countries. The relevant and important quality attributes found in some African and Asian studies are quite different from those found in the present studies (see, for instance, Salau, 1979; Salau, 1986; Wai, 1991). The main issue here is the stability of the weight vectors over time, places, and people. Are the obtained weight vectors still applicable in, for instance, 1999? Are they applicable in environments in which the range of values of environmental attributes is different from the ones studied? These questions remain open.

Although, therefore, the results may not be generally applicable, perhaps a more important question is whether the research methodology used in the presented empirical studies is generally applicable. The multi-attribute evaluation of environmental quality presented in this monograph is a synthesis of research concepts and methods from both the fields of behavioural decision theory and environmental sciences. As was concluded before, this analysis may be called fairly successful. Therefore this synthesis may be also successful with respect to other larger environments (e.g., spatial levels such as the global or fluvial level) or environments in other cultures. Even beyond the boundaries of environmental sciences applications may be found, for instance the multi-attribute evaluation of 'quality of care' or even 'Quality of Life (QoL)'. In the introductory chapter (Chapter 1) 'environmental quality' has been identified as one of the constituting attributes of 'QoL'. Other attributes were, for instance, one's health, family, friends, work, leisure, etcetera. In this way, quality of life may also be seen as a (hierarchical) multi-attribute concept. The previously presented multi-attribute evaluation procedures then may serve as a valuable tool for the analysis of these multi-attribute concepts. While performing such an analysis, among other things, the relative importance of environmental quality in relation to other 'QoL'-attributes may become apparent.

In conclusion: The presented evaluation of environmental quality may be seen as an illustrative case-study. Multi-attribute evaluation according to methods and procedures from behavioural decision theory may provide an important tool for the conceptual analysis of various multi-attribute policy and research concepts.

The effect-based view adopted in this monograph was referred to as a
These dimensions were: perceptual saliency, type of adjustment required, value or valence, degree of controllability, predictability, necessity and importance of the source, ties to human behaviour, and, finally, duration and periodicity. These have been discussed in Chapter 2, section 2.3.1.
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thinking, how they were feeling, what they were doing, where they were and with whom. This method may be adapted to investigate an individual's responses to annoying residential attributes in real life. Respondents may be asked to describe possibly occurring annoying events. Next, respondents may indicate if, and if so, how they dealt with the annoying event, whether or not it interfered with an activity, the frequency and intensity of occurrence, the timing, the extent to which it is valued negatively, whether or not the event was attributable to other persons' behaviour, and so on. This is repeated several times a day, for several days a week. In this way a detailed recording of a person's relationship with his or her environment may be achieved. The analysis across respondents may reveal valuable information about the personal, temporal, social and spatial factors that may influence the person-environment relationship and give more insight under what conditions (personal, ambient, or both) residential attributes are considered to be (dis)satisfying or annoying.

In conclusion: From a theoretical point of view, next to the structural analysis of environmental quality by means of a multi-attribute evaluation, a contents analysis in which annoying events are studied in real life situations would give more insight into the person-environment relationship. Such an analysis should involve an evaluation of (a) attributes of the person, (b) attributes of the environment and (c) attributes evolving from the interplay between them. Diary methods may be a suitable tool for data collection.

8.4.3 Implications for empirical research

The review of the empirical research on the perceived quality of urban residential environments (see Chapter 2) revealed several topics. First of all it was concluded that the possibly relevant residential attributes were inventoried by the researcher(s) only and that they may not be complete. In one of the studies presented in this monograph residents were asked to make an inventory of relevant residential characteristics. The results of the 'MAU' study indicated that the prespecified list provided by the investigator was a fairly good representation of relevant attributes but residents were able to add several relevant attributes not already present on the list. Due to the design of the study, those additional attributes could not be incorporated in the evaluation procedure.

In conclusion: It is advisable, in future multi-attribute evaluations, that all relevant attributes are inventoried in advance. Firstly, a separate survey may be conducted on the relevant attributes among residents. This should lead to a complete list of all relevant attributes. Only after this is done, respondents should be presented with the possibly relevant attributes for further evaluation.

It was assumed (see Chapter 3) that a weighted linear combination of single-attribute values would constitute the best practical model. Only in the 'HMR' study (Chapter 4) the relationship between overall evaluations and single-attribute values has been studied. For the lower-level residential attributes a linear additive aggregation rule resulted in a reasonably high 'model fit' ($R^2$). The relationship for the higher-level residential attributes was found to be weak. It was concluded that the complex and rather abstract nature of the higher-level attributes, especially 'environmental quality' itself, may have resulted in a high proportion of error-variance. Error variance may be reduced by using a more refined elicitation technique than the one used in the preceding studies (a five-point scale). Using ratio-scaling techniques (see Chapter 3, sections 3.2.3 and 3.2.4) may lead to reduction of error-variance and to a more reliable assessment of 'perceived environmental quality'. Error-variance may also be reduced by treating
environmental quality as a multi-dimensional concept instead of as a uni-dimensional concept, as was the case in the previous studies. Recall that, in the three studies among residents, overall perceived environmental quality was elicited indirectly by asking respondents to what extent they would regret it if they had to move. In a multi-dimensional assessment of 'environmental quality', it may be viewed from various perspectives, such as a behavioral, an affective and/or a cognitive perspective. Questions on the extent to which someone 'would regret to move', 'intends to stay', 'is attached to his or her neighbourhood', 'feels secure in his or her neighbourhood', 'experiences feelings of alienation', or 'is satisfied' may be used to construct a composite measure of experienced environmental quality which may be a more reliable and valid assessment measure than the one used in the present studies.

The multi-dimensional nature of 'environmental quality' may explain the low observed correlation between the indirect ('regret to move') and direct ('residential satisfaction') assessments of environmental quality in the 'CA' experiment (see Chapter 7, section 7.3.3). The two assessments may both represent different dimensions of the same concept. 'Regret to move' may pertain to the affective dimension whereas 'residential satisfaction' is more closely related to the cognitive dimension of 'environmental quality'.

In conclusion: A multi-dimensional assessment (behavioural, affective, cognitive) of perceived environmental quality in combination with a more refined elicitation technique may result in a more reliable and valid assessment of perceived environmental quality.

Several personal characteristics were found to influence perceived environmental quality but their influence appeared to be modest. In general older people, people high in SES, people reporting fewer health complaints, and home-owners appeared to be more satisfied with environmental quality than younger people, people low in SES, people expressing more health complaints, and tenants. These results are a confirmation of the findings of the research on the influence of personal characteristics on residential satisfaction reviewed in Chapter 2. As already mentioned it remains unclear why, for instance, older people are more satisfied with their residential situation than younger people. In Chapter 2 several hypotheses on this topic have been presented. From a theoretical point of view it would be interesting to analyze the above relationships further.

Finally, it was concluded that experts' and residents' evaluations were highly comparable with respect to the relevant attributes, their structuring, and their relative importance with respect to perceived environmental quality. However, the extent to which residents and experts agree on the evaluation of actual residential situations remains unclear. The observed differences in the literature between experts and residents may originate from differences in the evaluation of actual sites. In a comparative study on the evaluation of actual neighbourhoods the extent of agreement between both groups should be investigated further. Then it may become clear whether or not the proposed analysis of perceived environmental quality may or may not be solely confined to municipal policy advisors and managers.