Modeling constraints-based choices for leisure mobility planning : development and test of a constraints-based conjoint choice model for the ex ante evaluation of leisure mobility policies

DOI:
10.6100/IR470025

Document status and date:
Published: 01/01/1996

Document Version:
Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Technische Universiteit
Eindhoven
FACULTEIT BOUWKUNDE

43

MODELING CONSTRAINTS-BASED CHOICES FOR LEISURE MOBILITY PLANNING

DEVELOPMENT AND TEST OF A CONSTRAINTS-BASED CONJOINT CHOICE MODEL FOR THE EX ANTE EVALUATION OF LEISURE MOBILITY POLICIES

Marcus P. Stemerding

Modeling Constraints-Based Choices
for
Leisure Mobility Planning

development and test of a constraints-based
conjoint choice model for the ex ante evaluation of
leisure mobility policies

PROEFSCHRIFT

ter verkrijging van de graad van doctor aan de Technische Universiteit Eindhoven, op gezag van de Rector Magnificus, prof.dr. M. Rem, voor een commissie aangewezen door het College van Dekanen in het openbaar te verdedigen op maandag 11 november 1996 om 16.00 uur

door

Marcus Pieter Stemerding

geboren te Rotterdam

Dit proefschrift is goedgekeurd door de promotoren:

prof.dr. H.J.P. Timmermans

en

prof.dr. Th.A.M. Beckers (Katholieke Universiteit Brabant)

Cover design: Tekenstudio, Faculteit Bouwkunde

CIP-DATA KONINKLIJKE BIBLIOTHEEK, DEN HAAG

ISBN 90-6814-543-6

Preface

As a geographer born and bred in Randstad Holland, many people were surprised to see me going South to get my PhD. I could hardly convince anyone that there are in fact real universities *under the Great Rivers*, let alone that I would spend four long years to complete an in-depth study there. After all, there is no geographical faculty in the *generality countries*, so, how should a geographer get a PhD there? To all those people I can simply say, yes, it can be done. The result lies here before you.

It was Marianne Wagemans of the Co-operation Center of the Brabant universities (SOBU) who had brought together two geographers *in diaspora*, Theo Beckers and Harry Timmermans. Subsequently I was given the chance to write my own research proposal at the department of leisure studies of Tilburg University and the urban planning group of Eindhoven University of Technology. SOBU supports co-operation between departments of the two universities by funding multi- and interdisciplinary research projects. As such, these projects aim at some form of integration of themes or approaches within an interesting research problem. For me the interdisciplinary approach was nothing new; after all, geographers are used to view research problems from a variety of angles. Multidisciplinarity, however, raised a number of difficulties for me. I learned that between scholarly disciplines many differences exist in culture, jargon, points of view and daily habits (what's in a name: at the department of leisure studies the working day starts an hour later). It took some effort not to be mangled between prejudices on both sides. Of course, Eindhoven (anonymous sources) thinks of itself as the *paper writing machine,* practical, methodologically sound and reliable, and sees Tilburg as the impractical *would be intellectuals*, wasting too much time contemplating theory. On the other hand, the erudite scholars of Tilburg find the Eindhoven approach rigidly formal, uncritical on theory, far too practical, and going too much into irrelevant details. My role was to (dis)agree with both sides and to act according to my own ideas and skills, which, I hope, is reflected in this thesis.

In the research proposal I produced under the supervision of Harry and Theo we aimed at a study in which spatiotemporal constraints were to be integrated in a conjoint choice model. Hence, conjoint models would be extended and, at the same time, measurement procedures for leisure constraints would be improved. The model was to be applied to the problem of planning to reduce the increasing leisure car mobility. In 1991, leisure mobility was relatively unexplored, a situation in which Theo Beckers saw an interesting new topic of research. Theo's foresight proved right: now it is a hot public opinion issue and, as it occurred to me on conferences, also attracts international notice. The recent media coverage of the new *Lovers* train connection between Amsterdam and Ymuiden beach demonstrates this increasing public interest.

Many people have supported me in producing this thesis. I thank them all. First, Harry Timmermans, my *promotor primus*, who, in spite of the enormous work load he takes on, is never in a hurry, always finds time for his PhD students, and, moreover, never seems to loose his good humor. Harry is an anomaly for leisure research: never let that man fill out a time budget diary! It is not that he is such an enthusiast that he can't tell work from leisure, it is just that, with his legendary multi-tasking skills, he conducts it all simultaneously. Theo Beckers, the *promotor secundus*, has proved his value with his extensive experience in tourism and recreation policy and his sharp nose for auspicious research themes. I owe many thanks to all my colleagues of the urban planning group, of whom my senior colleagues Harmen Oppewal and Aloys Borgers, Benedict Dellaert and my *room mates* Astrid Kemperman and Eric Molin deserve special acknowledgment for their comments and advice. Not the least I'm grateful to Mandy van Kasteren for her invaluable assistance and support. Also invaluable has been the contribution of OG. Indirectly, their payments of taxes and duties may have funded this study. I owe thanks to my dear wife, Evelien van Bentum, for her infinite patience and mental support. For her I am afraid that, now that I have found myself a real job, all that leisure has come to an end.

Utrecht, 20 september 1996

Contents

1 Introduction

In modern western society, the consumption of leisure products and services has increased steadily since the second world war. Although still some two thirds of leisure time is spend at home, the out-of-home activities have typically resulted in increased distance consumption. More trips requiring longer distances are made for leisure purposes. For any leisure activity, either holidays, day-trips, sports, or visits to family and friends, more kilometers are being traveled.

The car can be regarded as the main catalyst of the growth of leisure mobility. The introduction of the affordable individual motor vehicle provided the consumer with the means to individually explore an area larger than ever before. Seeking a more pleasant environment away from the crowded cities and industrial sites, many people decided to move to suburban residences. The availability of the car meant that real distance barriers disappeared. The car, and the rapid development of a comfortable road infrastructure sustained the freedom of travel. No other industrial product is so widely conceived as the ultimate symbol of individual freedom as the car.

Parallel to the spread of the car, some socioeconomic trends provided the necessary conditions for the rapid growth of leisure consumption. Considerable increases in labor productivity allowed a reduction of working hours and caused a growing affluence, especially among lower and middle classes. It meant that the individual had more time and money to spend on leisure activities. While the car provided means, these socioeconomic trends supplied the consumers with the opportunity to pursue newly achieved individual freedom.

This trends has been further amplified by planning concepts and government intervention. From the early decades of the twentieth century onwards, leisure and recreation have been regarded as the necessity to escape from the city. In this opinion, rural and natural areas were to provide the necessary complement of work in the city (Beckers, 1983: 86). During this period, government policies have also been influenced by this anti-urbanist paradigm of spatial segregation of work, living and leisure. Planning aimed at providing recreation facilities far away from urban life. In order to accomplish a sufficient amount of leisure and to recuperate fully from daily worries, it was theorized that people would require to dissociate from the city. The mental distance to the unhealthy urban life was to be achieved by traveling a substantial physical distance. As a consequence, recreation is regarded as a problem of urban planning: natural locations need to be found and developed for the pursuit of leisure activities.

These developments in the demand for leisure activities and a positive interference of government gave rise to a rapid expansion of the leisure industry, with a growing number of attractions, resorts, theme parks, and the like. The accompanying advertising and promotion campaigns created a demand for a wide range of out-of-home leisure activities. The widespread availability of the motorcar and the public willingness to invest in road infrastructure did not constrain development along main routes or near major population concentrations. On the contrary, many cheap sites were selected for the development of a theme park, a holiday resort or other tourist attractions. In fact, remote locations were often viewed as advantageous, because of lower land prices and the obvious psychological benefit of separation from the crowded urban cores. Thus, the post-war development of the leisure industry resulted in a geographically deconcentrated spatial pattern of peripheral leisure attraction destinations.

In recent years, the public view on leisure and recreation has changed dramatically. Contrary to the anti-urbanist views of the post-war era, the urban heritage and many of the cities' facilities are now regarded as ideal for tourism and recreation purposes. Moreover, public opinion on growth and development has changed as well. Environmental concerns and sustainable development are now prevailing issues. Cars in particular gained attention as the major contributors to both pollution and the consumption of natural resources. Moreover, the car was associated with traffic congestion and accessibility problems and its never ceasing spatial demands. It is not only the daily commuters' trips and business travel that cause car mobility, but especially leisure, tourism and recreation related travel that has boosted the post war mobility growth (cf. CBS, 1978-1995).

Both the perceived freedom of choice and the evolved spatial pattern of deconcentration require the use of car for leisure purpose. Other modes of motorized transport such as touring cars, trains and other forms of collective and public transport have the disadvantage of inflexibility: sometimes a destination cannot be reached within a certain time-slot. Moreover, public transport trips require more organization. In other words, several constraints cause public transport to be an unattractive alternative. Paradoxically, the leisure and tourism industry here bites its own tail. Access to tourist and recreation destinations typically depends on the car. Nonetheless, while pursuing freedom, long rows of cars queue up at attraction entrances. While seeking clean air and pleasant landscapes, tourists inhale their own exhaust fumes and see the view spoiled by asphalt. Recently, awareness of this paradox has increased in the leisure industry. Clean transport and reduced mobility are heavily debated issues nowadays.

Recreation and tourism thus cause a major threat to the environment, in terms of air pollution, damage to the landscape, and also congested access to tourism sites. Authorities at various levels, transport planners, and property managers are now jointly working to bring about a modal shift away from car to environmentally friendly transport alternatives. Mobility plans aim at influencing mode choice behavior of consumers when executing their leisure activities. In the Netherlands, a variety of such mobility plans, of infrastructural initiatives and promotional measures, has recently been introduced to this end (cf. Beke *et al.*, 1991; Toerisme & Recreatie AVN, 1995).

The success of such initiatives will largely depend on how adequate they are in meeting consumer demands. Market research may therefore support the planners' decisions regarding these mobility plans. Although empirical research suggests that transport mode choice is the outcome of a decision process that is very difficult to manipulate. This applies *in extremis* to transport mode choices for leisure and tourism activities (Kingma & Jansen-Verbeke, 1989; Beke *et al.*, 1991). Still, for an efficient planning, it is necessary that planners, managers and marketing directors have advance knowledge of the results of their actions. Therefore, they require an *a priori* assessment of their programs and initiatives, however complicated that task may be.

This study aims at providing the research tools for such planning research. More specifically, a model is developed that allows planners to assess their policies in terms of consumer demand. This model incorporates individual preferences, choices and constraints. The latter component is important in that we assume that some successful planning initiatives will require one to alleviate constraints to behavior, especially when the choice of transport mode is concerned. The model builds on the conjoint-choice paradigm (cf. Louviere & Timmermans, 1990a; 1990b).

Conventional conjoint approaches focus on how preferences shape behavior. However, most conjoint studies lack the notion of individual constraints that influence choice behavior. At various stages in the process, however, individuals may be constrained by a variety of factors (Godbey, 1985; Crawford *et al.*, 1991). Constraints may preclude participation in certain leisure activities. Constraints may, however, also play a role in the choice decision for leisure transport. Planning may be more effective by using the knowledge of what elements constrain the relevant target groups (cf. Searle & Jackson, 1985b), and how these constraints affect choice decisions. Therefore, this study aims at incorporating constraints in a conjoint modeling approach, and thus involves the question whether this integrated preference/ constraints approach can be applied in the context of leisure mobility planning.

Such a model requires an understanding of the choice decision process. More specifically, we are interested in how different elements of the process, constraints and preference factors, interact. This requires an analysis of which elements are critical to this process, and how these elements are related. These elements need to be identified and measured. Moreover, we need to know which actions consumers are likely to take when confronted with changes in their choice environment. We also need to know which constraints can be distinguished and how they influence the choice decision process. Finally, preferences and constraints need to be combined into a conjoint modeling approach to improve the predictive validity of conjoint models, and thus increase the insight they provide into the choice decision process.

This application of the constraints-based conjoint model is to be achieved through a decision support system (DSS) (cf. Timmermans (ed.), 1993), which planners and managers can use to support their planning initiatives. This system is to predict effects of potential planning initiatives. The system involves the modeling of behavioral response to planning initiatives, by means of a constraint-based conjoint model.

The study thus supplies a set of research tools and concepts to confront consumers with planning initiatives and to consequently gain a quantitative insight in tourists' reactive behavior. Ultimately, such information would support planning and marketing decisions. Managers can improve the quality of their decisions with the insight in the likely effects of their (potential) plans of action on consumer behavior.

This thesis is organized as follows. Chapters 2 and 3 describe the background of the study. In chapter 2, we discuss the problems of growing mobility in general and of leisure mobility in particular. A number of mobility statistics are presented to support the notion that initiatives to reduce leisure mobility growth are necessary. Next, examples of political interest in this problem are discussed, and features of leisure mobility are compared with other types of mobility. Chapter 3 considers the means of planning to be used to reduce leisure mobility growth. The development of planning in general is briefly reviewed against the background of some general trends in society. Certain demographic, socioeconomic, geographic and sociocultural trends have consequences for the consumption of leisure goods and services. Planning is required to operate within the framework set by developments in society, which shape not only the object of planning but also the face of planning itself. A number of examples of local tourism mobility plans are discussed in light of these developments. Research can support mobility planning, and a list of requirements research should fulfill is presented.

The first requirement is to analyze processes of choice behavior and to identify opportunities to manipulate consumer choice. Chapters 4 and 5 provide the theoretical and conceptual basis for such an analysis. In chapter 4, a number of relevant approaches to leisure behavior theory is reviewed. Although many different scholarly approaches exist, we focus on those approaches that directly link the choice decision process to behavior and the question how behavior can be influenced by planning initiatives. Methods to measure choice decision processes and to model and simulate associated leisure behavior are reviewed in chapter 5. A conceptual model, which integrates preference and constraints approaches in a single choice model, is presented.

The remainder of the thesis concerns the empirical part of the project. It starts with the qualitative identification of the elements of the leisure mode choice decision, which is followed by a segmentation of the day trip attraction market. Results of the analyses are used as input to a quantitative choice experiment, results of which in turn serve as the input for the decision support system. The qualitative identification of choice attributes and constraints is discussed in chapter 6. An in-depth survey was carried out for this purpose, derived from the repertory grid and decision plan net methods. We concentrate here on the destination and transport mode decision for traveling to day-trip attractions, such as theme parks, zoos, and museums. These data were used to derive a market segmentation (see chapter 7): groups with different preference structures are identified. Planning can be directed more adequately to such target groups, as different action plans or programs might be effective for different segments. The findings thus constituted the basis for a conjoint study which is outlined in chapter 8. In the experimental setting of a conjoint study, respondents were confronted with some potential actions and requested to choose between series of destination / transport mode alternatives. Conditions were specified to assess the influence of potential constraints. The model specification and estimated parameters are discussed. Different specifications of the model are formulated for different types of constraints. The model specifications are compared and conclusions for the distinguished segments are drawn.

Chapter 9 then presents the simulation model, which allows planners, managers, and other decision makers to simulate the likely effects of their planning decisions. The simulation model can therefore be regarded as a decision support system. Potential action plans for all destinations are discussed, for the three distinguished segments. Specific and generic measures are compared by means of the simulation model, and recommendations for leisure mobility planning are given. Chapter 10 summarizes the results of the empirical studies and draws some conclusions. The strengths and weaknesses of the proposed approach are discussed. The study closes with a number of recommendations for future research, and theoretical and methodological refinements.

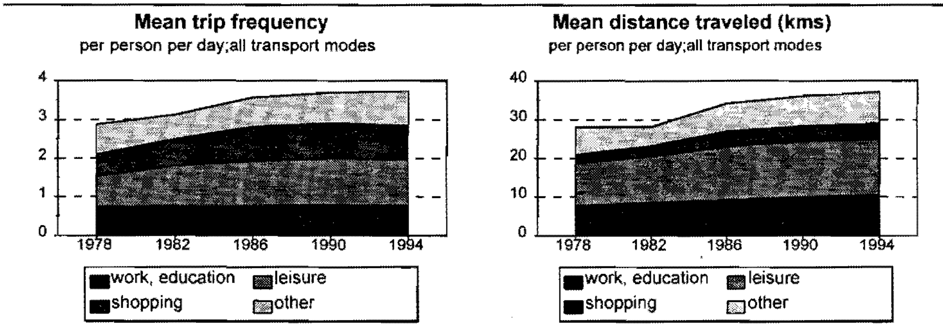
2 Leisure Mobility

2.1 Introduction

Mobility is, by definition, an essential aspect of tourism and recreation. The ability to move around freely, from any origin to any destination, is one of the major achievements of the welfare state. It has been the main facilitator of tourism and recreation. Figures for the Netherlands show that leisure mobility has been growing steadily over the past decades, and that, of all activities, leisure is now the dominant one: on average, people now travel most for leisure activities (see Figure 2.1). In recent years, both the public and the private sector have recognized the growth of leisure mobility as a problem. More specifically, cars used for leisure are the primary perpetrator of congestion, crowding and parking inconveniences at tourist destinations and leisure attractions. Moreover, cars cause environmental pollution. Although political attention is clearly less than for the daily commuters, policy objectives have now been formulated to reduce leisure car mobility, and a number of initiatives have been launched.

This chapter outlines the problem of leisure mobility. It consists of an analysis of figures and statistics, and compares different mobility definitions, types and categories. Subsequently, an outline of political and other interests on this subject is given, and policies are discussed. We focus on the differences between leisure and commuter mobility, and on the competition between car and public transport.

Figure 2.1 Trip frequency and distance traveled, different purposes, 1978-94[1,2,3]



(source: CBS, 1979; 1983; 1987; 1991a; 1995a)

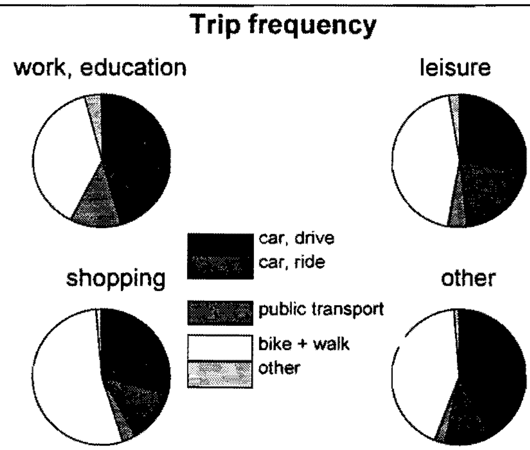
2.2 Leisure mobility in figures

The Central Bureau of Statistics (CBS) and the Social and Cultural Plan Bureau (SCP) are the main providers of mobility statistics. Here we primarily use figures from the mobility panel *Onderzoek Verplaatsingsgedrag* (OVG, *Research Mobility Behavior*, collected by the CBS), and, supplementary, the time budget study *Tijdbudget Onderzoek* (TBO, collected by the SCP). The OVG provides more precise information, by distinguishing more mobility categories. Furthermore, data are collected and published annually, whereas TBO has a lower frequency. Two important disadvantages of the OVG data cannot be neglected and

[1] Data were derived from *Onderzoek Verplaatsingsgedrag*, a mobility survey in the Netherlands, among persons over 12 years of age.
[2] The figures do not distinguish between recreational shopping and routine household shopping.
[3] Travel abroad is not included.

must be considered while interpreting the figures. First, the OVG does not include holiday travel, which may account for a large part of leisure travel. Furthermore, OVG does not distinguish between recreational shopping and the routine household shopping, where the first clearly belongs to the leisure category, and the latter to household activities. These two factors underlie some differences in outcomes between the two sources OVG and TBO.

Figure 2.2a Modal split, trips for purpose, 1994



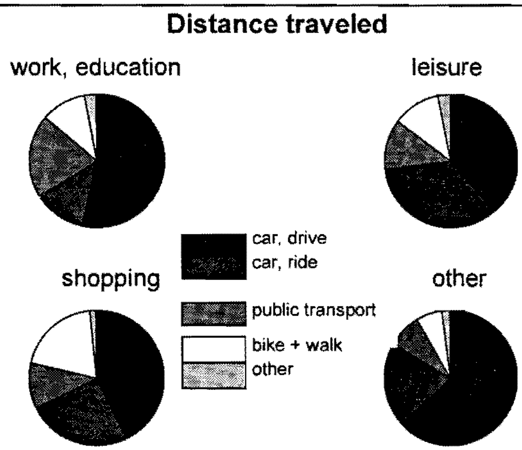
(source: CBS, 1995a)

In the OVG panel data, the CBS distinguishes the following categories of travel motivations: (1) *work*; (2) *business*; (3) *social visits*; (4) *shopping*; (5) *education*; (6) *relaxation and sports*; (7) *touring and walking*, and (8) *other*. In the figures we show in this chapter, (i) *work and education* form a single category: we regard all these as daily commuter trips. Visits, relaxation and sports, and touring and walking together constitute the (ii) *leisure* category, whereas business and other together form the (iii) *other* category. We do not change the (iv) *shopping* category, but it should be kept in mind that these trips are made partly for leisure and partly for household activities.

2.2.1 Leisure mobility and other types of mobility

Figure 2.1 displays mobility growth in the Netherlands over the past 16 years. During this period, leisure has been its largest contributor. While commuter travel has been stable over this period, leisure and shopping mobility have been growing in volume. Over 30 per cent of all trips are made for leisure now, and nearly 40 per cent of all kilometers result from leisure activities (see also SCP, 1994), where it should be noted that travel abroad is not included in these figures.

Figure 2.2b Modal split, distance traveled for purpose, 1994



(source: CBS, 1995a)

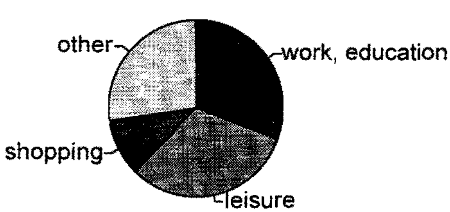
Although people often walk or cycle for their leisure trips, almost half of all trips and nearly three quarters of all distance is covered by car (see Figure 2.2), either as a driver or a passenger. Measured in trip frequency, public transport has a negligible market share. However, the pie chart of distance traveled for leisure shows a substantial share of 13 per cent, indicating that relatively greater distances are traveled by public transport. Of all car kilometers driven in the Netherlands, over 30 per cent is made for leisure activities (see Figure 2.3), which equals the number of commuting.

2.2.2 Subcategories of leisure mobility

The above figures comprise a wide range of activities for leisure mobility. Being concerned with mobility aspects, we will naturally concentrate on outdoor leisure activities. The mobility figures of OVG distinguish between *social visits, shopping, relaxation and sports,* and *touring and walking.* Tourism and recreation activities could be allotted to any of the three categories *shopping, relaxation and sports*, or *touring and walking.* Other sources do not make a distinction based upon activities, but on duration of the activity. A widely used distinction for instance is between long-term holidays, short breaks, and day trips (cf. NRIT, 1995).

Day trips form an important segment of the domestic leisure market. In the 1990/91 season, 869 million day trips were made by the Dutch, which averages 5 day trips per person per month (CBS, 1992). More detailed information on day trips is provided by the *Onderzoek Dagrecreatie* (ODR), also collected by the CBS (1992). The most recent data were collected in 1991. CBS defines day trips as any leisure activity that lasts longer than two hours; 43 per cent of the day trips lasted longer than four hours.

Figure 2.3 Distance driven by car for different motives, 1994



(source: CBS, 1995a)

Of all day trips, 55 per cent were made by car, 8 per cent by public transport. "Typifying the day trips by the most important activity during the trip, it appears that 33 per cent of the trips fell in the category *sports and sportive* *recreation* or *watching sports* and 19 per cent in the category *going out*. 15 per cent of all day trips were classified as *shopping for pleasure* and 14 per cent as *membership activities and hobbies (other than sports)*. Visits to tourist attractions account for 9 per cent of all day trips, as do the activities *swimming, sunbathing, picknicking and day camping* and *touring*. " (CBS, 1992, p.8).

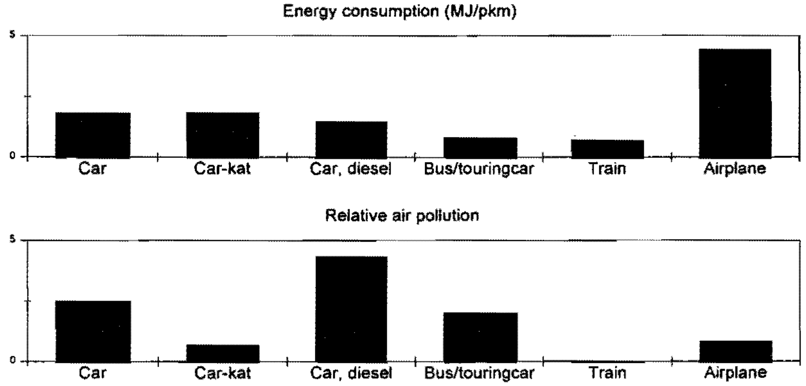
Annually, some 20 million visits are made to large scale theme parks in the Netherlands (defined as receiving over 100,000 visitors each year; NRIT, 1995). Some 10 million visits are made to large scale museums (same definition; NRIT, 1995). Contrary to most other leisure destinations, these are trips that involve relatively large traffic flows.

2.2.3 Environmental effects of leisure mobility

With the importance of its mobility component, leisure thus accounts for substantial environmental pollution, CO_2 emissions and other emissions that affect human health, congestion, consumption of scarce space and energy, degradation of natural resources, and distortion of valuable landscapes (cf. Raad voor het Natuurbeheer, 1994; Tensen, 1996). The energy consumption of car travel for leisure is compared with other categories in Figure 2.4. The car is a relatively large energy consumer: compared with, e.g., train, cars use approximately twice the energy per traveler's kilometer.

In terms of environmental pollution per traveled kilometer, cars have a large damaging effect. A number of objectively measurable environmental effects of travel are displayed in Appendix A (Tensen, 1996). In terms of emissions of CO_2,, CO, volatile organic materials, NO_X and aerosols, car travel is a lot more damaging than train travel. Train travelers cause more SO_2 emissions. CO_2 (carbon dioxide) has a supposed influence on the so-called greenhouse effect and global warming. CO (carbon monoxide), volatile organic materials and aerosols damage human health. NO_X (nitrogen oxides) and SO_2 (sulfurdioxide) contribute to soil acidification. Furthermore, cars use more space than any other transport mode.

Figure 2.4 Environmental effects, per traveler kilometer

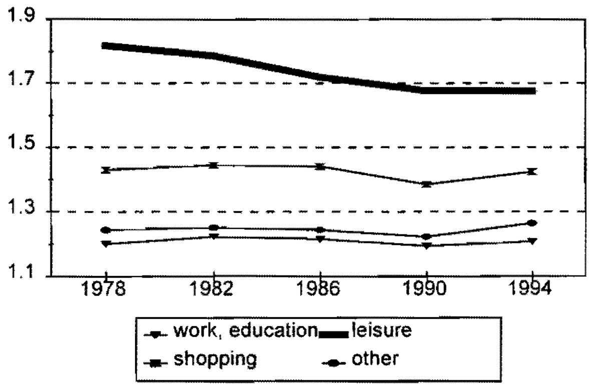


[1] Car-kat: car on catalyst converter

(source: Raad voor het Natuurbeheer, 1994; Tensen, 1996)

It should however be noted that for leisure, cars are less damaging to the environment per traveled kilometer, caused by the simple fact that, cars tend to carry more people for leisure. Figure 2.5 shows that the occupancy rate of cars has always been higher for leisure than for commuter traffic. However, this rate has been declining steadily since 1978.

Figure 2.5 Car occupancy rate, 1978-1994, for different purposes



(source: CBS, 1979; 1983; 1987; 1991a; 1995a)

2.2.4 The importance of leisure

Mobility growth is not the only negative impact of leisure, but one of the most important. Practically all recreation and tourism types generate traffic flows and mobility. Theme parks, hotels, beach resorts, golf courses, ski slopes, to name a few, have their own specific effects on the environment, with varying degrees of damage. Examples involve erosion of the soil, distortion of landscapes and cultural heritage, and also sometimes disturbance of local economies.

We need to realize, however, that leisure, recreation and tourism together form a major and growing industry that benefits the economy in terms of gross national product, balance of payments, employment and industrial innovation (Beckers, 1995; CBS, 1995). Table 2.2 shows the expenditures of tourists and the employment generated. Moreover, leisure activities bring a vast range of personal, social, and health benefits (Beckers, 1995).

Table 2.2 Tourist expenditure and domestic employment 1992

	expenditure, billion NLG	employment, 1000 FTE[4]
Domestic tourism		
day trips	11.6	62.5
holidays	3.6	15.5
Inbound tourism	8.7	36.0
Outbound tourism	9.0	26.0
Tourist goods	2.1	6.0
TOTAL	35.0	149.0
indirect employment		51.0

(source: NRIT, 1994; CBS, 1995)

Therefore, it may be argued that emphasis should be on the reduction of the negative impacts of leisure, not on leisure as such. It can be argued that mobility as such is not the problem, but that only the actual emissions, other pollution and consumption of resources are the relevant issues. Technological innovations for cars and infrastructural systems are suggested to solve these problems. However, not much has been accomplished by technology to date. Mobility has increased in such a dramatic way, that innovations such as more efficient car engines, cleaner fuels, route guidance systems, extra safety measures, etcetera, have not yet brought a substantial decrease in overall emission levels, environmental damage, let alone traffic accidents and congestion. Hence, it seems that explicit mobility policies, planning concepts and marketing strategies that augment and supplement innovations in technology are urgently required to address the problem of increasing leisure mobility.

2.3 Political attention and policy formulation

2.3.1 Recognition of the problem

Being of a non-routine nature, leisure mobility has some specific features that distinguish it from commuter or business mobility. Users place different demands upon the transport mode, and recreation and tourism destinations have different locational characteristics. Recently, in and outside the Netherlands, policy objectives to reduce leisure mobility have been formulated, at local and regional levels (cf. Elands & Beke, 1994; Den Haag, 1995; National Park Service, 1995), and at national and supranational levels (cf. Rijksplanologische Dienst, 1991; Raad voor het Natuurbeheer, 1994). Some of these initiatives stem from physical and spatial planning, others from economic planning and transportation planning. The private sector is also recognizing the negative aspects of growth (Beke *et al.*, 1992). Gunn (1994: xxiv) noted that the environmental movement has had its worldwide influence on tourism development: "Travelers are more aware of the quality of destinations and seek cleaner, safer, and more interesting locations. Host areas are increasingly aware of environmental issues of pollution, toxic waste, and destruction of resources". Other than just the promotion of their resorts and

[4] FTE: Full time equivalents

attractions, organizations in recreation and tourism now increasingly become aware of the practical necessity of a careful, sustainable, planning for tourism development. Planning to this respect is concerned with where tourism developments take place, how well these fit the needs of the market, how it utilizes resources, and how innovation and expansion can be carried out with responsibility to the environment.

While leisure is a numerically more important component of total mobility than any other travel purpose, it is not leisure mobility but daily commuter traffic that receives most political attention. Commuters account for some 30 percent of all mobility (CBS, 1995a). Most policy programs proposed and carried out by the Dutch government have aimed at reducing home-work-home mobility. Among these policies, generic measures have prevailed. Fuel price taxation is directed at the variable costs of the car to discourage car use. Extra taxation on car purchase has been implemented in order to reduce car ownership, and thus car use. Furthermore, public transport is stimulated by government subsidies to keep ticket prices at a competitive level. Generic policies should have their impact on any travel purpose, and thus on both commuter and leisure mobility. Also, to relieve the pressure of commuter mobility, more specific policies have been implemented. Policies on the location of enterprises, in conjunction with special infrastructural programs were aimed at facilitating the train or transit journey to the place of work. Furthermore, tax relief programs on commuters' season tickets have been implemented, in order to stimulate the use of daily public transport.

The *Structure Scheme Traffic and Transport II* (Ministerie van Verkeer & Waterstaat, 1988) of the Dutch department of transport and public works, is generally considered as a landmark in the development of national mobility reduction policy. However, it did not yet identify leisure mobility as a problem. *PRO*, an independent advisory board for spatial policy and planning research in The Netherlands, did recognize leisure mobility as a specific issue, and formulated a number of research questions concerning car mobility and leisure (Beckers & Raaijmakers, 1991; De Jong, 1991). It was only in the annual report of the National Planning Service (Rijksplanologische Dienst, 1991), that a direct government body announced its research demand on the feasibility of programs to change the modal split of leisure. Whether specific acts of planning are required to bring about this modal shift, or generic policies would be sufficient, is however subject of discussion. A report on leisure mobility of the department of transport and public works, that was announced in 1991 and projected for 1993, was never published. Programs to reduce leisure mobility specifically were conceived as politically sensitive, interfering in the individual's personal freedom, thereby possibly harming one major achievement of the welfare state.

2.3.2 Specificity of leisure mobility

Leisure mobility has its distinctive features that differentiate it from other mobility purposes. Therefore, specific action programs are required. Commuter travelers are different from leisure travelers: as is shown in Table 2.3a, while only a third of the Dutch people is engaged in work activities and thus commute (16 per cent are engaged in education), nearly everyone is engaged in leisure activities: 99 per cent (CBS, 1991a: 14; see also SCP, 1994: 393). Commuter travel has a routine nature; commuters largely use the same route every day. Leisure trips on the other hand are less regular, and differ in various other ways. Travelers are therefore less likely to be engaged in an exhaustive information search on mode alternatives for leisure than they would for commuting. Consequently, the competition between transport mode alternatives, e.g., between car and public transportation, works differently.

First, leisure trips are not undertaken on a daily basis, and, secondly, there is a wide variety of different destinations. Hence, there is less comparison between travel options. In most cases, this implies that any alternative other than the car is not considered. Thirdly, geographical factors are important: destinations for work have different locational characteristics than those for outdoor leisure. Work locations are usually more spatially concentrated, while leisure destinations have a diffuse spatial pattern. Fourthly, on holidays, people would consider time as a less important factor while traveling for leisure. People may accept a lower speed if that would enhance the leisure experience. On the other hand, one is willing to travel greater distances. As a consequence, leisure trips have a larger geographical scope. Fifthly, leisure trips are usually undertaken with larger travel parties, e.g., with the family. Table 2.3a shows the higher car occupancy rate for leisure trips. Transport modes should therefore allow to accommodate these larger groups. The car is the most ideal family transport, while train and bus may be regarded as appropriate for more individual transportation.

Table 2.3a Differences, mobility for work and education, and for leisure

	work and education		leisure	
	share (%) (growth 1978-1994)			
participation	work 33 education 16		99	
trips	20.5	(+2.7%)	31.5	(+51.3%)
distance	28.3	(+34.8%)	39.0	(+33.8%)
car driven trips	22.8	(+16.0%)	26.8	(+54.5%)
car driven distance	31.1	(+50.4%)	31.1	(+33.6%)
average distance (car)	13.6 km	(+32.0%)	12.3 km	(-13.7%)
average distance (all modes)	19.3 km	(+29.5%)	16.5 km	(-11.6%)
car use (% trips)	37.6	(+12.9%)	28.8	(+7.1%)
car use (% distance)	53.4	(+11.5%)	38.7	(-0.3%)
car occupancy rate	1.21	(+0.8%)	1.68	(-8.3%)
public transport use (% trips)	11.7	(+46.3%)	4.2	(-18.6%)
public transport use (% distance)	21.1	(+163.8%)	12.7	(+47.7%)

(sources: CBS, 1979; 1995a; 1991a; 1991b; SCP, 1994)

Finally, people often travel for leisure in weekends, evenings and after 9 AM on weekdays, while trips for work have different, and very specific, peak hours. The congestion at peak hours makes cars less attractive, and enables public transport companies to operate more efficiently. Tables 2.3a and 2.3b summarize the differences between leisure and commuter mobility.

Table 2.3b Differences, mobility for work and education, and for leisure

work and education	leisure
daily routine	incidental
one destination; same route	wide variety of different destinations
concentration of locations	diffuse pattern of locations
individual	with family, or other travel party
more or less obligatory	more or less freedom
scarce time is important factor	time is less important
speed of traveling is important	comfort and relaxation is important
limited geographical scope	wider geographical scope
peak hours: workday rush hours	some peaks in weekends, holidays
comprehensive information search	hardly any information search

2.3.3 Policy implementation

The above list of factors demonstrates that leisure mobility has some specific characteristics that distinguish it from commuter travel. All these factors have their specific effects on the travelers' choices, and thus on the competition among transport mode options. For example, its routine nature and spatial concentration will theoretically favor commuter travel by train, while the non-routine, diffuse spatial pattern of leisure trips favors the car. Before implementing any policies to reduce leisure car mobility, e.g., by influencing these mode choices for leisure, one should begin with considering these factors. That should include a consideration of the scale of implementation, and thus of the balance between generic and specific policies, and whether a national approach is necessary or local plans would suffice. The implementation of the plans itself does also involve its embedding within the policy and planning system as a whole, raising new questions of responsibility, division of tasks, procedures, the selection of policies, and issues of enforcement, performance and promotion. In the next chapter we elaborate on the role of planning as the instrument of policy implementation.

3 Planning and Leisure Mobility

3.1 Introduction

Planning provides the means of implementing policy. While the objectives of policies describe what must be done to solve the problem of interest, planning states how this is to be carried out and embraces a range of mechanisms and instruments for achieving it. Planning is therefore procedural, offering an array of methods for securing a desired condition (Burton, 1989). It should however not be seen as the paving of a road to a given goal. During the planning process, objectives may be adjusted continuously. Meanwhile, the financial situation, the political climate, the underlying objectives, the market, or other circumstances may change. It depends upon the planning method used whether these changes are observed, and whether the planning procedure can adapt to these changes. A variety of planning methods has been used over the last decades, differing in procedural format, its flexibility or strictness of objectives, the participation of public and private sectors, and the interaction between participants. Also, the role of research and the implementation of its results has varied among these planning methods.

The most important trend in planning over the past decade has been an increasing orientiation towards the market. It was the reclining role of the government and the subsequent cuts in funding that gave the impulse to this development. Planning for recreation and tourism was also surrendered to market forces: more and more plans are now required to be financially self-supporting without government support. Consequently, plans now focus more than before on consumer needs, preference and demand, and thus future use. Meanwhile, trends in society have caused a process of diversification in the consumer market. Individualism is the most notable of these trends. As a result, the analysis and prediction of consumer demand has become more complicated. Research for planning therefore faces new requirements and challenges to meet this growing complexity. More elements need to be incorporated in research to account for factors such as tastes and preferences, and responses to individual constraints.

Research is a key issue in defining and formulating the initial policy objectives and investment goals. As such, research involves the problem analysis. Its results outline the nature of the problem and gives direction to what kind of policies are required. Research plays a role during the planning process as well. It is used to examine the feasibility of plans, or to assess the impact of a variety of policies. Consumer research addresses problems such as the use of newly developed sites, the effect of policies on consumer demand and the existing supply structure, traffic impacts, direct and indirect impact on the environment, etcetera.

Planning provides the means of implementing policies, and research is one of the means of directing planning. This chapter describes developments in planning and leisure mobility plans, and identifies some relevant socioeconomic trends that are reflected in those plans. Planning has developed over the past decades, reflecting the circumstances of a changing government role and market trends. The analysis of leisure mobility plans demonstrates that planning increasingly depends on the market, which is steadily diversifying. We describe the relevant socioeconomic trends that have caused developments of ongoing heterogeneity and complexity, and diversification of consumer demand. The chapter concludes with an outline of the requirements of planning research, and a discussion of how to implement research results.

3.2 Trends in planning

Sharing responsibilities and a market-orientation are key issues in planning since the 1980s. These reflect recent trends that have developed in the past two decades: decentralizion and contracting out of government tasks, and a focus on marketing and the role of consumer behavior. Most recently, a growing emphasis on sustainability has been observed in planning. Voogd (1995) gives a brief overview of these developments of planning in the Netherlands since 1970. Table 3.1 lists the most distinctive trends that occurred during this period. These trends did not replace each other, but were merely newly upcoming accents that changed the focus of the planning procedure.

Table 3.1 Trends and shifts in planning after 1970

	accent	**motivation**
before 1970	(spatial) design	technical expertise
1970-..	objectives, norms	democracy
1975-..	strategies, problem solving	choices and decisions
1980-..	negotiation, division of roles	power
1985-..	marketing, public-private co-operation	market developments
1990-..	sustainability	quality

(Voogd, 1995, p.17)

Negotiation was the first trend that was observed from the early 1980s onwards; the role of the national government was decreasing, while the desire was growing to allow various parties of interest to participate in the process. The planning method that developed from this trend was labeled *negotiative* planning or *communicative* planning (Dietvorst, 1993a: 78-79). Other characteristics of planning trends during the eighties and early nineties are a predominance of the economic perspective, a strong market orientation and the involvement of lower level authorities. An example of this market orientation is given by Ashworth & Voogd (1990a; 1990b).

The realization that a plan would not be viable without a healthy economic basis shifted the previous focus from the objectives itself to the feasibility of its objectives. It was therefore to be expected that planners turned their attention to the users of their plans, either the dwellers of housing developments, or the visitors of shopping centers, or the tourists visiting recreation facilities. Consumer preferences and consumer behavior were being studied to assess future use. The Fourth Report on Physical Planning (Ministerie van VROM, *Vierde Nota Ruimtelijke Ordening*, 1988) officially confirmed that planning at a national level was limited to the creation of conditions, the so-called *stimulative* planning, with decentralization as leading principle. That is, the execution of planning, and negotiations with private parties and the community, should be delegated to the lowest possible level, i.e., the municipality level, or in some cases the province level. Most recently, a trend toward planning for sustainability has been observed. This means that pollution and contamination, the ecological balance, natural resources and other environmental factors are included in the plan, in order to provide a healthy long-term basis. In fact, all plans of some volume and significance in most Western countries legally require a survey on environmental effects. Sustainable planning is defined as a form of planning where the preservation and protection of the environment are explicitly incorporated in the objectives of the plan.

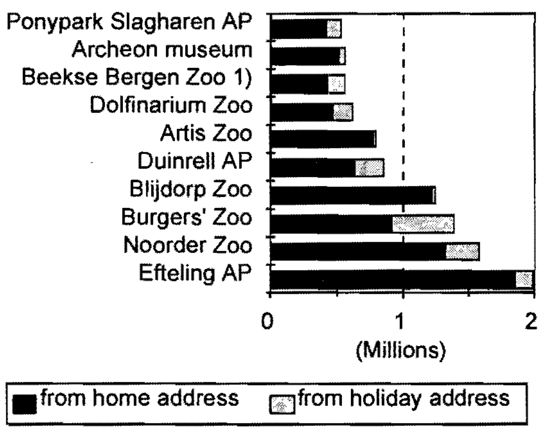
3.3 Examples of programs to reduce car use for leisure

The specific nature of leisure travel requires leisure specific policy programs. These involve influencing tourist demands for transport modes, through e.g. initiatives on the location of leisure destinations (near public transport facilities), decisions on temporal allocation of initiatives (scheduling of public transport service on leisure hours), promotion and advertising campaigns specific for tourism and recreation, and a distinct consideration of routes and infrastructure. In this chapter, we concentrate on those acts of planning that focus on voluntary behavioral change. As examples in the United States show, more radical measures may sometimes be required to solve an urgent problem. In 1995, the popular Yosemite National Park in California closed its gates for all cars after reaching its carrying capacity limit. The vulnerable ecological balance, the road capacity, and limits to management staff, made such an intervention necessary. Similar situations occurred in Zion Canyon National Park (Utah) and Colorado National Park. The National Park Service is now working on programs with special clean-engine coaches and parking lots at the entrances (National Park Service, 1995). In the Netherlands, such actions would be unthinkable, because of the commercial damage that might be done. All mobility reduction programs were aimed at a voluntary modal shift, mostly in joint co-operation with the private sector. Naturally, commercial interests are more important for theme parks, beach resorts, and city centers than for National Parks.

Specific and concrete action can be taken at day-trip attraction sites. As was discussed in the previous chapter, these destinations feature relatively large numbers of visitors, and are therefore important concentrations of leisure travel. Stimulation of train and transit use is relevant for these large scale destinations, and is potentially lucrative. Figure 3.1 shows participation figures for the top 10 of day-trip attractions and museums in the Netherlands; during the season thousands of visitors pass the gates of these sites each day. The Dutch railway company, *Nederlandse Spoorwegen (NS)* considers the day trips as an important growth market (Van Hagen & Van Ooststroom, 1994). Leisure trips occupy the trains during off-peak hours, and can therefore accomplish a more efficient use of the train capacity at relatively low cost. In 1994, 12 per cent of all train travelers' kilometers were made for the purpose of tourism and recreation, while 23 per cent were made by commuters.

Since a number of years *NS* has been promoting day trips by train with the yearly publication of the *Er-op-uit!* book. A wide variety of destinations is offered with combined train, shuttle service and entrance tickets, with a small discount (*Er-op-uit!*, 1995). More important than the discount, the entire day trip is purchased in one go, and bus links or shuttle services are provided where necessary. When buying such a ticket, the traveler is provided with information leaflets to facilitate transfers and links with bus shuttles. In the edition of 1995, *NS* offered 80 day trips, among which trips to museums, zoos, theme parks, events, city trips, and trips with combinations of different activities. Nearly all major attractions are included in the list of destinations. Furthermore, across the country, 63 cycling routes and 67 hiking routes were developed between stations. *NS* took care of providing signposts along the routes and information leaflets. The railway company has not yet published any results of evaluation research on the effects of these planning initiatives on train use for tourism and recreation.

Figure 3.1 Top 10 of attractions, Dutch visitors, March-August 1994



1) not a NS day trip

(source: NRIT, 1995, p. 30)

Beside the stimulation of train use, other actions or combinations of actions may be considered to influence the modal shift. More integral programs have been designed involving discouragement of car use, and stimulation of public transport and other environmentally friendly modes. Some of these projects have passed the experimental stage and have now been established on a more definitive basis; others were canceled for varying reasons. The following section describes and analyzes a number of these projects in the Netherlands. The success of such a project can be read from its continuity over a longer period of time, and results in terms of modal split and decreased car use.

3.3.1 Zeeland Beaches mobility experiment

In the summer of 1990, an experimental mobility program for the Zeeland beach tourists was introduced (Beke *et al.*, 1991), as a joint project of the railway company (NS), regional bus companies, and campground proprietors. Temporary subsidies were provided by the province of Zeeland, and some national departments. The project involved direct train connections from the large cities in the province of Noord-Brabant (Tilburg, Eindhoven, 's-Hertogenbosch and Breda) to the train stations in Zeeland (Middelburg, Vlissingen), bus shuttles from the destination train stations to the beach locations of Walcheren, and bus routes from campgrounds to the beaches. Beke *et al.* (1991) performed an evaluation study of this experiment. They confirmed that the newly introduced bus lines did succeed in attracting travelers to the public transport options, but that in absolute terms car use had not decreased. New tourists were attracted by the enhanced public transport facilities, mostly people not in possession of a car. People who would otherwise have stayed home, would have traveled somewhere else, or would have traveled less comfortably were the users of the experimental connections. Tourists who were used to travel by car did not change their behavior. The direct train connection was no success at all as the increase in use was too low. The authors thus concluded that to acquire the desired modal shift, more supporting initiatives are necessary. They noted that continuity, promotion and thus acquaintance and familiarity of the public transport connections would be needed. The extra train service was terminated after the first year; the shuttle services did manage to run after the initial subsidized period.

3.3.2 Renesse Transferium

From 1995 on, a transferium is being planned in the seaside resort of Renesse in Zeeland (Jansen *et al.*, 1995; Hogendorp & Bakker, 1993). A transferium is basically a large scale park and ride facility with a high level of service quality. It enables an easy and comfortable transfer from the car to another mode, in most cases some sort of transit. The Renesse transferium will be designed to transfer tourists from their cars to mainly bus shuttles, but also to rented bicycles, trams, horse carriages and more playful transport modes. The project therefore primarily aims at relieving the pressure of car traffic from the town center and the beach locations, and not on car mobility reduction as a whole. The parking area under development will contain 900 spaces, in total a third of all visitors would be transferred through the transferium. The municipality of Westerschouwen is also developing a mobility plan, in which a number of supporting actions is proposed. These involve push initiatives to get people out of their cars, such as canceling or pricing existing parking space and closing the town center for cars. In addition, pull initiatives are proposed to stimulate the use of public transport. One of the notable elements of the plan is the pedestrian route from the transferium through the town center. In the present situation, the old center is crowded with parked cars and cars driving around to find parking spaces, which has a negative effect on its commercial attractiveness. The pedestrian routing along the souvenir shops, bars, cafés and restaurants will give new business opportunities. The project will be launched in 1996.

3.3.3 Mobility plan Scheveningen Bad

In the summer of 1995, the municipality of The Hague (Den Haag, 1995) launched a project for the popular beach resort of Scheveningen. Inhabitants, shopkeepers and enterprises of the town of Scheveningen experienced inconvenience from the ubiquitous parked cars and cars driving around looking for parking space. This situation was conceived to damage the quality of life, accessibility, attractiveness and thus the profitability of this seaside resort. The mobility plan aims at increasing the share of public transport and bicycles in the modal split, and minimizing car use. Actions were proposed such as car park guidance systems, a number of park and ride facilities further away from the crowded sites, infrastructural initiatives to enhance routes for cyclists and pedestrians, and a more flexible transit service, adjusted to the tourists' peak hours. Essential to each act of planning is its promotion. Signpost information and advertising campaigns were considered crucial to the success of the plan. After all, planning actions are directed toward a voluntary change of behavior, and thus consumers will require information about alternative transport options. As yet, it is unknown whether the mobility plan has been proved successful.

3.3.4 Mobility demonstration project Archeon

Archeon is an archaeological theme park in Alphen aan den Rijn. Its main theme is the early history and archaeology of Holland, from the Roman to the middle ages. Actors play their respective roles in an authentic environment with buildings, crafts and clothing in genuine style. The park was opened in 1994 and had the possibility of developing a mobility policy from the very beginning of its existence (Beke *et al.*, 1993; Sprenger & Beke, 1993). For this reason, and for its location central in the Randstad, the park received support from the Ministry of Economic Affairs as a mobility demonstration project. The objective was to set an example for future developments of theme park tourism and mobility. The plan implied a direct incorporation of mobility objectives in the park's marketing strategy. This mobility-communication plan emphasized an improvement of the attractiveness of public transport to *Archeon*, as an integral part of the promotion of the park as such. The initiatives involved the presentation of games and gadgets at the purchase of a train-and-entrance ticket to begin the *Archeon* experience from the home station. Similarly, carriages and wagons with the actors on board were proposed for the shuttle service between the station of Alphen aan den Rijn and the park entrance. A monorail connection between the station and the park entrance was proposed, but was not considered financially feasible. Several measures were taken to inform the public on transportation options to *Archeon*, such as information on schedules of train and bus service in the regular advertising and promotion material. Moreover, a number of policies were targeted at specific groups, such as foreign tourists, organized groups (tour operators), the elderly, and young people. Unfortunately, the number of visits to *Archeon* in 1994 and 1995 fell short of the expectations, and financial troubles have been threatening the continuation of the park. It is therefore impossible to assess the success of the mobility plan.

3.3.5 Mobility plan Veluwe

A final example is the mobility plan for the Veluwe region which was launched in the summer of 1994, and was financially supported by the Ministries of Economic Affairs, Transport and Public Works, and Agriculture (Elands & Beke, 1994; Elands & Oomens, 1994). The region is mainly a nature protection area, a large part of it consists of national park *De Hoge Veluwe*. It is also one of the main tourist regions in the Netherlands. The plan integrates campaigns for behavioral change, structural planning initiatives and a local and cluster oriented approach. Through advertising campaigns the environmental awareness of the public is increased, and alternative transport modes (public transport, cycling, hiking) are promoted. In addition, cycling, hiking and horseback riding routes through the forest, and more activities with an emphasis on nature protection, education and the internalization of environmentally friendly behavior are created. The forest routes are integrated into the so-called *Green Travel Network*, being linked to public transport connections. Structural initiatives involve enhancing the quality of public transportation, discouraging car transport, and increasing means of communication, such as signpost information and mapping of bus routes and updating the tourist bureau information. The Veluwe mobility planners realized that a general approach would not be sufficient. Therefore, different location types and clusters were identified, each with their distinctive mobility characteristics. They identified nature and forest areas, extensive outdoor recreation areas, villages and towns, events, campgrounds and bungalow parks, and large scale (commercial) tourist attractions. Separate mobility programs were designed for each of the facilities within these clusters.

The large scale tourist attractions are the most important in terms of car use reduction. Several theme parks are within the region, for which separate mobility programs were designed: the *Open Air museum* and *Burgers' Zoo* in Arnhem (Elands *et al.*, 1992), *Dolfinarium* in Harderwijk, *Apenheul* and *Paleis het*

Loo in Apeldoorn, and the *Kröller-Müller museum* in the national park *Hoge Veluwe* (Van Keken & Beeksma, 1995). The mobility programs emphasize the quality of the transit connections between the major railway stations and these attractions. Reduction of the waiting time between the transport links, higher attractiveness of the public transportation facilities (e.g., special shuttle services), and combined train and entrance tickets were introduced.

The participants in the mobility plan identify a number of conditions that determine the success of the mobility projects. Each project aims at being financially self supporting. Projects must be effective in terms of a modal shift from car use to more environmentally friendly modes. The market orientation of the mobility plan is expressed in the approach of consumers' preferences, target groups, their activity patterns, and the decision process of transport mode choice. Market research and analysis is used to increase the effectiveness of the projects. Finally, promotion is recognized as the main tool of communication between the producer and the consumer, and thus crucial to a successful planning.

An evaluation study was be conducted one year after the implementation of the planning initiatives (Van Keken et al., 1995). It was concluded that the mobility effects were meager in terms of modal shift. This was partly caused by the yet unfinished pedestrian infrastructure. The authors note that the effects were hard to measure independently, because many other factors may play a role.

3.3.6 Comparison of leisure mobility plans

Table 3.2 summarizes the five mobility plans on a number of relevant characteristics. Bus (and tram) companies participated with shuttle services in all plans. In the *Veluwe* and *Archeon* plans, the involvement of *NS* is limited to the combined train-entrance tickets, whereas *NS* contributes extra train services to the *Zeeland beaches* plan. The *Veluwe* mobility plan is the most complete and comprehensive of all plans, as it comprises 7 major attractions and a large recreation area. Moreover, a large number of institutions participated in the plan, although not all to the same extent. The *Archeon* plan is only supported financially by the national government, whereas in the *Veluwe* plan a more direct role of participation is played by the three government departments concerned. Local authorities are the leading participants in *Scheveningen* (municipality of The Hague) and *Renesse* (Westerschouwen). All plans have some private sector involvement, but in the cases of *Scheveningen* and *Renesse* this was restricted to a market inventory and a consultation of the relevant (small) enterprises, while in the three other plans the private parties had more direct involvement. Here, larger enterprises participated, such as the *Archeon* park itself, *NS* and the campgrounds (*Zeeland beaches*), and the major attractions (*Veluwe*). Although all plans had some co-operation between the public and private sectors, only in the case of the *Veluwe* plan there is an actual partnership, with shared (financial) responsibilities and legal arrangements. In the other plans, either public parties, as in the *Scheveningen* and *Renesse* plans, or private parties (as for *Archeon* and the *Zeeland beaches*) are the initiating and firstly responsible participants.

Important to distinguish upon are the objectives of the plan. For the *Scheveningen* and *Renesse* plans, the main objective is to relieve the resort from the pressure of congestion and overcrowding by the ubiquitously parked cars. Crucial in both plans are therefore action on parking to effectuate a more efficient flow of the tourists. It is very well possible that the car congestion objectives are met, while car use as a whole increases. In the other plans, parking inconvenience is of secondary importance as these aim at the reduction of car use as a whole. Rather than an economical objective, these plans have an environmental concern. In concrete terms, however, the direct result of the objectives is to be seen as the effective modal split at the destinations.

For all projects mentioned, little is known to date about the impact of the mobility reduction initiatives and programs on modal split. As the *Zeeland beaches* experiment demonstrates, the introduction and promotion of new transport options only is not sufficient. On the other hand, radical measures such as those at the American National Parks may work for public facilities without a profit objective, but will not be possible for any private, profit dependent, theme park. Therefore, it may be useful to conduct market research in order to assess the likely effects of planning actions and to use research results to support decisions. Steps in the research procedure include firstly an inventory of the existing markets. This involves the question of who the (potential) consumers are for this particular destination, and which demands do they have for transportation.

Table 3.2 Summary of mobility plans

	Zeeland	Renesse	Scheveningen	Archeon	Veluwe
period launched	1990	1995	1995	1994	1992-'94
evaluated	1991	not yet	not yet	not yet	1992, '94
participants					
municipality/-ies		●	●		●
province	○				●
national	○			○	●
bus company	●	●	●	●	●
NS	●			○	○
private business	●	○	○	●	●
objectives					
car use in general	●			●	●
congestion relief	●	●	●		●
actions					
parking		●	●		○
bicycle facilities		●	●		●
shuttle service	●	●	●	●	●
train connection	●				
train-entry ticket	●			●	●
consciousness					●
advertising	●	○	●	●	●
signposts	○	●	●	●	●

○ minor element
● important element

The next step implies the question which initiatives would work for this group of consumers. Simultaneously, research on how is this potential market could be reached needs to be conducted. As all plans demonstrate, advertising and promotion needs to be taken seriously. Finally, since all plans aim at some form of financial profitability, they need to be economically analyzed, by estimating the balance of costs and benefits. Profits can, for example, be made through the use train and shuttle services, parking fees, and a possible market growth.

As the examples show, the national government does not participate directly in any of the six mobility plans, except for the *Veluwe* mobility plan. Here, subsidies were granted on a temporary basis, because of the experimental and exemplary nature of the project. Direct participation in the planning process is accomplished by local (municipal) and sometimes regional (provincial) authorities. The case of leisure mobility can be seen as an example of the reclining national government and the new planning paradigm. While the national government has problems with formulating its policy regarding the reduction of leisure mobility, the municipalities and local enterprises recognized the problem and pragmatically started to develop and execute concrete plans.

The economic predominance and market orientation is expressed by the fact that all plans described aim at financial returns, or at least at economic self-support in the long run. The success of all planning depends on the market and its development, and is based on certain economic assumptions of income and willingness to spend, consumer preferences, and behavior under certain circumstances. In order to gather information on these variables, market research needs to be carried out. For each of the plans, some form of market research was conducted, and most plans also feature an extensive marketing and communication plan. Thus, they reflect the communicative approach of planning, where communication with the final consumer is most important. Market research is an instrument of such communication.

Here, one may argue that the reduction of car mobility to the tourism sites as the main objective of all plans is an evident indication of planning for sustainability. The *Veluwe* plan was the most far-reaching on this point. Part of the plan was a promotion campaign to raise the environmental consciousness of the public, advertised in newspapers and magazines, on billboards and posters. There are however some weaknesses to the sustainability of the plans, in association with the other modern planning components. First, problems may occur when the results of a plan are made dependent of its economic viability. If the plan would not be feasible, it would not be carried out and, e.g., environmental damage would thus continue.

Secondly, environmental objectives may not serve the main interest of all participants involved. As for the private parties and the local authorities, their concerns are with the accessibility of the site, the attractiveness of the tourism environment, and the reduction of bothersome crowding. When this would be accomplished with an increase in car use, their objectives would have been met, while the problem as such has only partly been solved. Air pollution, for instance, is the concern of higher level authorities. Moreover, the solution of a problem at a certain location could cause another problem at an neighboring location. For example, an increased use of train services might cause an overcrowding of trains, which in turn might force commuters to use the car instead. Co-ordination at a higher level is therefore required. In other words, there still is an area of responsibility for the national government

In the next section, we will elaborate on the role of market research within the procedures of planning. Crucial to the mobility plans is whether they can cause the desired effects. A variety of decisions can be considered to arrive at an optimal use of the plans developed. Market research aims at providing information adequate to support these decisions. It aims at giving answers to considerations of what information do planners need, how to gather this information, and how to make an optimal use of the information.

3.4 Trends and market research for planning

All plans mentioned in the previous section had some involvement of private sector parties. The *Archeon* demonstration project was a completely private initiative, with some (financial) support from the national government. At the other extreme, the *Scheveningen Bad* mobility plan has been developed by the municipal authority, be it with a thorough consultation of the relevant shopkeepers and other entrepreneurs. The *Zeeland beaches* plan had no intervention of any public body at all, as it was jointly developed by *NS* and the parks (however, at the time of writing *NS* is still a publicly owned company). Moreover, all plans show an interest in consumer behavior. The facilities require minimum numbers of tourists to be economically viable, and thus a certain attractivity. Initiatives aim to change the individual's choice behavior, voluntarily and in the desired direction. Therefore, the plans described all breath the conviction that planning is no longer the concern of an independently operating government: they are subject to the economic laws of supply and demand. The day trip sector is mainly demand driven; planners are therefore interested in the individual consumers, their preferences, their behavior, and how to accomplish behavioral change. These variables need to be explicitly investigated to be able to assess future use of tourist attractions.

Consumer behavior is naturally social behavior. Social variables, as interactions with the direct and broader social environments, are among the most important factors. When viewed from the individual, choices are made and vary, to a certain extent, within the framework of society. Observed from an aggregate viewpoint, we can however see that society itself is subject to permanent change. These changes may directly cause changes in preference and taste for leisure supply, but may also affect the influence that certain background variables have on choices. In other words, the interactions of the individual, social behavior and society are under a constant transformation. Recent dynamic developments show a rapid diversification of demand, having repercussions on the supply side of leisure and tourism (Van Lier, 1993: 5). These socioeconomic and cultural trends have increased the complexity that planners are faced with. Hence, besides developments in planning itself, these trends strengthen the need for a careful preparation of planning initiatives and the requirement to anticipate their effects.

3.4.1 Socioeconomic and cultural trends

"Characteristic for the development of tourism and outdoor recreation in the eighties is the shift from 'supply-thinking' to 'demand-thinking'. Suppliers of all kind of tourist and recreation goods and facilities focus upon the needs and preferences of potential users and/or visitors. Consumers are more critical than before and look for quality, variety and challenge. The market for leisure goods and services in general has become fragmented and therefore a new approach in tourist recreation planning and product development is necessary" (Dietvorst, 1993b: 87). The increasing need for specific market research has an important origin in a number of socioeconomic and cultural trends that have occurred in the past two or so decades. Although among these trends diverging developments may have taken place, they are all shared under the postmodernism concept (Urry, 1990: 82). "Postmodernism involves a dissolving of the boundaries (...)". A typical characteristic of (post)modern society is variety, that causes an ongoing differentiation in the demand for leisure goods and services (Dietvorst, 1993b: 87). Relevant manifestations of variety are the increased variety in types of households, and the variety of leisure behavior, needs and preferences within households, among individuals.

In Western countries a differentiation in the composition of households is observed. The traditional family (husband/father earns the only income, housewife, children) is gradually being replaced by other household types (Van Engelsdorp Gastelaars, 1989; Vijgen en Van Engelsdorp Gastelaars, 1991). It is a demographic process that causes this household type differentiation, but also sociocultural processes have contributed. Population growth has slowed down in the Netherlands, nevertheless there is still an absolute increase. The population is aging, which means that the number of young people is relatively decreasing. Behavior patterns, social interests and priorities will gradually be more determined by the older age cohort. Household types such as the older couples and the old single households are growing in importance caused by the aging development. The growth of most other household types deviating from the traditional family is caused by sociocultural developments. The traditional role-bound distribution of tasks between men and women has eroded and the influence of religion and the strict (sexual) moral has declined. It enabled the number of divorces to increase dramatically in the past twenty years, and the consequent growth of single-parent families. Other new household types relevant to this discussion are the double-income couples, either with or without children. In the same period, the influx of immigrants from the overseas colonies and the Mediterranean increased the number (of a variety) of ethnic minority households. Hence, society has become much more complex with a wider variety of household types, each with their demands and preferences for recreation and tourism, but also each facing specific constraints.

Being member of a certain household type does, however, not necessarily explain leisure behavior. In addition to demographic variables, lifestyle may be important. Dietvorst & Jansen-Verbeke (1988) for instance distinguished five types of young people, on the basis of their lifestyles (an amalgam of values, attitudes and activities): the bourgeois type, the self-centered type, the type that is critical of society, the autonomous type and the career- and consumption oriented type. Although all may belong to the same household type, their behavior patterns may be completely different. Moreover, individual members of the same household may have totally different tastes and preferences, or different obligations and constraints, and therefore show a different leisure behavior. Also, individuals themselves may not be constant in their preferences and constraints, and may need a constant change of new experiences. This hopping between various activities has been labeled variety seeking (Van der Heijden *et al.*, 1989), diversification (Fesenmaier, 1989), or differentiation and 'butterfly behavior' (Dietvorst, 1993b) and is referred to by sociologists as hedonism, individualism and postmodernism (cf. Mommaas & Van der Poel, 1989; Urry, 1990).

It is therefore questionable if background variables alone are the right entity for the analysis of leisure behavior. Background variables may set a framework of *leisure constraints* (cf. Crawford & Godbey, 1987; Jackson, 1988), as for instance children in the household limit the set of leisure opportunities. These limitations, however, do not indicate or determine behavior. Some leisure activities may be less obvious to be conducted, but still not impossible. Similarly, socioeconomic variables, such as income, may set boundaries to the amount that can be spend on leisure. However, an individual's income for instance does not tell how much money he would be willing to spend, and how certain cost of the leisure product is traded-off against other variables. Leisure constraints may be identified and explained through the analysis of background variables, but will fail to clarify these tradeoffs. The individual's own set of needs, attitudes, preferences are the variables to give these explanations of behavior, albeit within its given limitations. Market studies with an orientation toward individual consumer preferences and these constraints, attentive of the complexity of present day society, are therefore the most useful to assess and forecast the use of future leisure supply.

3.4.2 Planning research

In the Netherlands and other Western countries impact studies are compulsory to large infrastructural developments or building programs. For example, studies on the effects of a certain development on the (natural) environment, traffic flows, or supply structure need to be carried out. These impact studies deal with the indirect (and unwanted) effects of the development. In order to assess the direct (and desired) effects, a market oriented planning process requires the use of market research. Traditionally, descriptive studies of the population were used. In these studies background variables indicate the need for, e.g., recreation in certain areas. For example, a combination of the household composition in a certain region, socioeconomic status of the inhabitants, and the proximity of other recreational facilities would give a measure of future use of a new facility and spending behavior. However, it is questionable if such a straightforward analysis would suffice for the complexity of tourist behavior. As was mentioned in the previous subsection, predicting behavior on the basis of background variables has become increasingly disputable. With trends of individualism and diversification in demand, this descriptive research is now inadequate as a basis for planning. Such studies assume static structures and constant relationships between background variables and actual behavior. Background variables may cause constraints, and these constraints may be influential on choice, but the relationship is not necessarily a deterministic one (Dietvorst, 1993b: 110).

Forecasting studies with a behavioral component are more appropriate to assess the use of future developments. Such studies basically concentrate on the feasibility of projected developments. Its research questions involve the use of the new project, who will be the future consumers, will the objectives be met, and consequently how are the opportunities of economic profitability. Background variables may play a role, constraints may be influential, but by all means individual preferences and the individual's responses to constraining elements need to be assessed. Upon the results of feasibility research, the decision is made whether it is sensible to proceed with the project.

Moreover, also in earlier stages of the planning process, similar research questions may be important. When planners need to decide among a range of possible options, forecasting research can be utilized to explore the expected effects. Ideally, an independent assessment should be made of each action separately, and of any possible combination of actions. Subsequently, the optimal selection of actions can be made. Hence, market research guides the planning procedure, and gives direction toward the precise implementation of policy objectives.

Feasibility research is mostly consumer research, in which surveys and inquiries provide the necessary instrument to communicate with the (potential) consumer. A wide array of conceptualizations, theories, and methods and techniques is available to the researcher, in order to achieve the most adequate and appropriate results. (The next chapter will discuss the selection of research methods for market research to support planning decisions.) Market research can be used to support decisions on the feasibility of a development projected and on its direction. Different phases of the planning procedure may involve this market research.

3.5 Planning procedure and research

Planning does not provide general solutions to the problem of leisure mobility. As was discussed in chapter 2, generic policies to reduce commuter car traffic are not likely to work for leisure mobility. It has specific characteristics and thus requires specific action. For example, the individual information search procedure before choosing a transportation mode works differently for daily home-work-home trips than for occasional leisure trips. Moreover, leisure destinations have distinct locational characteristics that determine its accessibility, and thus influence mode choice behavior. Local level plans seem to be more favorable to meet the mobility reduction objectives stated. Some promising experiments and plans have been designed at the tourist destination level to influence tourist mode choice behavior and thus reduce leisure (car) mobility. These plans were all initiated in joint co-operation by local authorities and the private sector. It is generally accepted that these plans need a firm financial basis to be able to succeed. With the latter elements these plans reflect the present planning paradigm: delegation of government tasks to the lowest possible level, public-private co-operation, and, moreover, an emphasis on economic profitability and the working of the market. Market research to assess future use is indispensable to give direction to the initiatives of the plan and to decide upon its feasibility. An analysis on the basis of just background variables such as household characteristics, income status, and geographical characteristics, will not be sufficient to reach adequate results. Background variables may set a framework of constraints, and thus limit the opportunities of conducting behavior, but can not explain the complexity of consumer choice decisions as such. Research should refer to the elements that constitute individual behavior to reflect (post)modern trends such as individual variety seeking, differentiation and hedonism. Therefore, the appropriate market studies should take into account for instance individual consumer preferences and tradeoffs between these preferences and other variables.

The ends of planning research are to give the planner the adequate support to make the optimal selection of actions and thus to support the decisions to be taken. The role of research is to provide those pieces of information that are needed for this support. A flow chart (see Figure 3.2) shows a planning procedure and organization. Research plays a central role in this procedural scheme.

First, a problem analysis should be made. The first step involves a description and analysis of the leisure site and its accessibility. A number of elements need to be listed, such as, modal split, problems and bottlenecks of accessibility, situational characteristics, and potential seasonal influences. Secondly, the question of what should be achieved by the mobility plan comes up. Therefore, plan participants must set their targets and formulate certain objectives. For instance, targets to be achieved could be either a general reduction of car use, or a alleviation of crowding, or more efficient tourist flows. Next, an inventory of possible action programs can be drawn up. It is to result in a comprehensive list of all potential initiatives to achieve the targets set. This list can possibly be accomplished by a brainstorm session of all plan participants, in which all imaginable initiatives are discussed.

On the other hand, a thorough market analysis must be provided. It involves existing visitation figures, an outline of visitor characteristics, a market segmentation, an assessment of the potential market and of growth potentions. The background variables of the consumers are explored, which gives an indication of leisure constraints. Furthermore, their attitudes or preferences, and past behavior are analyzed. Also, the choice decision problem itself must be analyzed for the relevant visitor groups: which elements play an important role in the individual's choice decision, and how. Pertinent questions are who the existing consumers for this particular destination are, and whether and where possible new customers can be found.

Meanwhile, the division of roles, tasks, and responsibilities among plan participants must be made. Pertinent questions are who is to gain by the objectives formulated, and should therefore participate in the mobility plan, with which tasks, and to what degree. The responsibility question is an essential element of the plan.

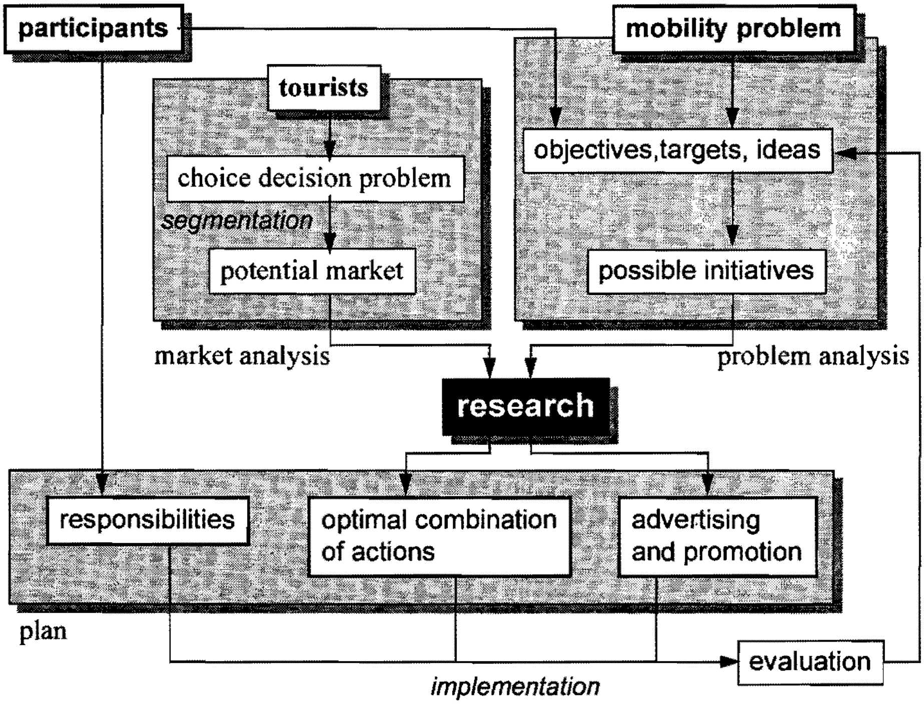
After the analyses of the problem and of the market, the actual research questions can be asked. A pertinent question is how the competition between different transport modes works for this particular location, and for this particular consumer market. It thus involves the confrontation of the consumer group with action programs. Here, a relevant research method would be a conjoint choice experiment, in which customers and potential customers of a specific leisure destination can be confronted with planning initiatives. The effects of an array of the action programs in varying combinations are assessed for this particular consumer group.

Next, the optimal selection of initiatives is made. The results of the previous steps are analyzed, which supports decisions to be taken upon which action plans can be combined. An substantial element of the optimum selection is the analysis of feasibility, whether the plan can satisfy the financial conditions stated. A crucial element of the plan is the promotional plan to communicate the mobility plan to the tourists. It involves questions such as how the consumers are to be reached, and how the acts of planning can be introduced to the public. Planners should take additional steps such as advertising campaigns in newspapers and magazines, provide information at tourist bureaus, and provide posters and signposts. Consequently, the definitive plan can be designed, with as primary elements the responsibilities, the action program and the promotion plan. The participants implement the plan by introducing the initiatives on mobility and communication.

After a certain period of implementation the plan's results can be measured and evaluated. The evaluation research implies an investigation whether the mobility objectives and the financial conditions have been met. Decisions upon the plan's continuity must be made. This step requires the consent of all plan participants. When the objectives have been met satisfactorily, they will decide to continue the plan. Otherwise, new policies and action programs would need to be considered.

The next chapter elaborates on research concepts and methods that incorporate elements of the choice decision process in forecasting studies for planning. In order to adequately gather the pieces of information outlined above, a thorough understanding of how the behavioral process works is needed. Theoretical work on the elements relevant to this choice decision process is explored. Here, we emphasize on tradeoffs between leisure constraints and leisure preferences.

Figure 3.2 Flow chart of the planning task procedure



4 Understanding Leisure Behavior

4.1 Introduction

Market-oriented planning aims to influence human behavior. The planning procedure comprises a number of stages; in its basic format, information is collected first, followed by the manipulation of behavior through preference factors and the alleviation of constraints. The increased leisure mobility can be regarded as the sum of individuals' voluntary behavior in interaction with the supply structure, given a set of conditions. Planning can contribute to reducing mobility growth and stimulate voluntary behavioral change by intervening in the supply structure and in the conditions under which choices are made. Acts of planning primarily aim at changing the availability and the attributes of choice alternatives: new options may be created, existing options may be changed. In order to achieve the required behavioral change, promotion is needed to make consumers aware of the changes in supply conditions and have them modify their preference structure. Newly introduced options need to meet consumer demand to be considered. Knowledge of consumers' preference structures and understanding of how the consideration process works is required to create and sell such highly attractive new products. Furthermore, any constraint that hinders choosing these new alternatives need to be alleviated.

Market research for planning aims to measure the impact of certain planning initiatives. A purely empirical approach would not suffice for that purpose, as Stockdale (1989: 122) stated: "If our ultimate aim is to explain and predict leisure choice, then we cannot afford to rely solely on non-articulated but essentially descriptive models and *ex post facto* analysis. Irrespective of whether our motivation to explain leisure choice arises from our desire to understand this important aspect of human behavior or the more practical need to plan for leisure provision, we must adopt a theory-driven rather than a data-driven approach which reflects our concern with predictive validity". Furthermore, in her opinion, socio-demographic variables cannot act as surrogates for, or operational indicators of, the factors that constrain or facilitate the expression of leisure preference in the selection of activities. To arrive at choice forecasting, higher quality results can be expected from research that explicitly studies the relationship between background variables and constraints and preference, and between preference and choice. A thorough conceptual understanding of how preferences and constraints operate within the decision process is required for such an analysis. The list of studies that assumed a direct relationship between resource availability, cultural and social influences, personal characteristics, and leisure behavior is extensive (Stockdale, 1989). Fewer studies have focused on the relationship between these variables and leisure preference or that between leisure preference and choice.

A number of theories of the individual (leisure) decision processes have been developed. Theories and concepts involved a wide variety of approaches (Fishbein & Ajzen, 1975; Iso-Ahola, 1980; Fridgen, 1980; Timmermans, 1982; Lieber & Fesenmaier, 1984; Godbey, 1985; Crawford & Godbey, 1987; Timmermans & Van der Heijden, 1987; Um & Crompton, 1990; Crawford *et al.*, 1991). Most conceptualizations of the choice decision process have in common that personal background, needs, values and motivations, with some variations on the theme, are assumed to influence the choice process. These factors interact with the physical environment. Consumers build their personal perceptions of the physical environment and form preference functions based on their evaluations of the attributes of their cognitive environment. Past choice decisions add to personal experience, and thus have some feedback relationships to the early stages of the process. Constraints (Hägerstrand, 1970; 1975; Crawford & Godbey, 1987; Jackson, 1988) interfere in several stages in the system, causing disturbances of the ideal process. For several reasons, certain options may be not available or accessible, in which case a barrier between preference and choice can be detected. Also, certain options may be unknown, which affects the cognitive environment and thus influences consumer preference structures.

The type of action programs we concentrate on in this study, those that aim at increasing the attractiveness of the environmentally sounder alternatives, will need to be evaluated with regard to their effects on behavioral change. In other words, we aim to support the exploration and selection of potential adequate and effective planning programs. This involves investigating how planning interventions affect all stages distinguished in the individual choice process, including final choice. In this study, we analyze the decision process by focusing on those elements relevant to planning and behavioral change. We limit ourselves to elements that can be manipulated by planning. Personal background variables, needs, motivations and values are therefore considered as given elements. Other elements of the process, however, may relate to these background variables, but are not explicitly studied. For example, preference is a function of personal motivation and choice may relate to both preference and motivation. Previous choices may also influence motivation and preference and thus again choice behavior. Thus, we need to understand these relationships as well. An identical argument is valid for the attitudes underlying preference and choice. Because planning is not directly involved with attitude change, we do not concentrate on these. However, attitudes may guide the process in certain directions. Attitude types and their relationships with other stages and elements of the process need to be identified and explained.

Stages and elements of the decision process that can be manipulated need to be recognized. In this chapter, we focus on the preference and choice theories, and the role of constraints in the choice decision process. The chapter starts with a brief discussion of theories of underlying values, needs, motivations and attitudes and how these may relate to leisure preferences and behavior. Next, a review of theoretical work on preference and choice is given. Constraints and barriers theory are discussed in the fourth section, followed by a conceptualization of constraint types.

4.2 Attitudes and backgrounds of the decision process

In the process of arriving at a choice, individuals take many different aspects into consideration. Different conceptualizations of this process have been suggested. Internal and external factors, such as personal aspirations and interactions with social and physical environment, may be relevant in the decision process. The goal of decision process analysis is to determine the relevant factors that affect this process. In the present study, we are concerned with policy relevant problems that require change in choice behavior. We focus on the question of how these problems can be solved by planning. As planning is primarily concerned with manipulating the physical attributes of choice alternatives, the focus is primarily on those attributes of choice alternatives that can be changed by planning programs or actions. Of course, choice processes are not only influenced by the attributes of the choice alternatives. Some attitudes or dispositions that are not based (only) on such attributes may play a role. We therefore discuss the potential role of attitudes in the choice process first.

Attitudes are described as consistent reactions to external objects (Fishbein & Ajzen, 1975). "Attitudes have been one of the most popular variables used in the consumer behavior field to try and predict consumer choice behavior." (Um & Crompton, 1990: 433). They are regarded as factors that cannot be manipulated directly, and are thus beyond the scope of planning. Moreover, attitudes are considered not to affect choices directly (Fishbein & Ajzen, 1982; McGuire, 1986). The relationship is indirect: through other variables in the decision process final choice decisions are influenced. Attitudes have been shown to be useful predictors of preferences, but their success in predicting behavior has been less definitive (Assael, 1984; Um & Crompton, 1990: 436).

In the work of Iso-Ahola (1980) personality explains the fundamental cause underlying all behavior. Nature (biological dispositions) and nurture (early socialization experiences) form the individual personality. This personality determines the individual's need for optimal arousal, diversity and variety (incongruity), thus causing the intrinsic motivation for leisure behavior. Specific leisure needs answer the question why people engage in a certain leisure activity. Attitudes form the container concept that includes all these elements and their mutual interactions and interrelations: personality, values, needs, and motivations.

When explaining behavior in terms of attitude, Fishbein & Ajzen (1975) distinguished three attitude components: an affective, a cognitive, and a behavioral component. The affective attitude component determines how the individual emotionally reacts toward an object. Taste plays an important role in this attitude. The cognitive attitude states how the individual consumer perceives objects, e.g., whether an intensive information search procedure is followed or not. The behavioral component determines whether the consumer acts according to the other two attitudes. It states whether the emotional and cognitive factors are allowed to affect the further choice decision process. For instance, an attitude toward behaving habitually, or on the other hand, an attitude of seeking variety, is contained in this attitude component. External information, such as information on recreation opportunities or all sorts of stimuli is filtered through these attitudes. "By definition, attitudes toward vacation places are composed of both a subjective probability that a destination is perceived to possess specified attributes, and an evaluation of the importance of those perceived attributes" (Um & Crompton, 1990: 441).

Attitudes are not stable in the long term, but change as societal values and fashions change. Jackson (1989) reviewed some empirical research (Knopp & Tyger, 1973; Dunlap & Hefferman, 1975; Geisler *et al.*, 1977; Van Liere & Noe, 1981) on attitudes and recreation activities, in particular environmental attitudes. Summarizing, Jackson (1989: 374) concluded that variations in leisure preferences are consistent with societal differences in values. Results from this empirical research are indicators of some developments regarding environmental attitudes. To date, our society may be described as a 'consumer society'; its values can be identified, and leisure and recreation preferences are consistent with these values. However, a small but significant minority of people has adopted values and attitudes that are at least partly consistent with those of a 'conserver society'. Growing acceptance of conserver-society values would result in measurable changes in recreational and leisure preferences. Much of their recreation and leisure is spent on activities consistent with these values. Knowledge of the relationship between outdoor recreation participation and environmental attitudes should assist recreation policy makers and planners in anticipating future trends in outdoor recreation participation.

A more complex and comprehensive approach to attitudes are so-called leisure styles or lifestyles (Dietvorst & Jansen-Verbeke, 1988; Kelly, 1989; Mommaas & Van der Poel, 1989; Urry, 1990; Dietvorst, 1993b), as mentioned in chapter 3. Examples of such styles are challenge-seeking, status-symbolizing, and family focus. Motivation gives the impulse to conduct behavior. Motivation is described as the internal factor giving direction to leisure behavior. Extrinsic factors such as status, competition and rewards, or satisfaction of others can underlie motivation, as consequences of leisure behavior. Intrinsic motivation relates to the leisure activity as such.

4.3 Preference, choice and the decision process

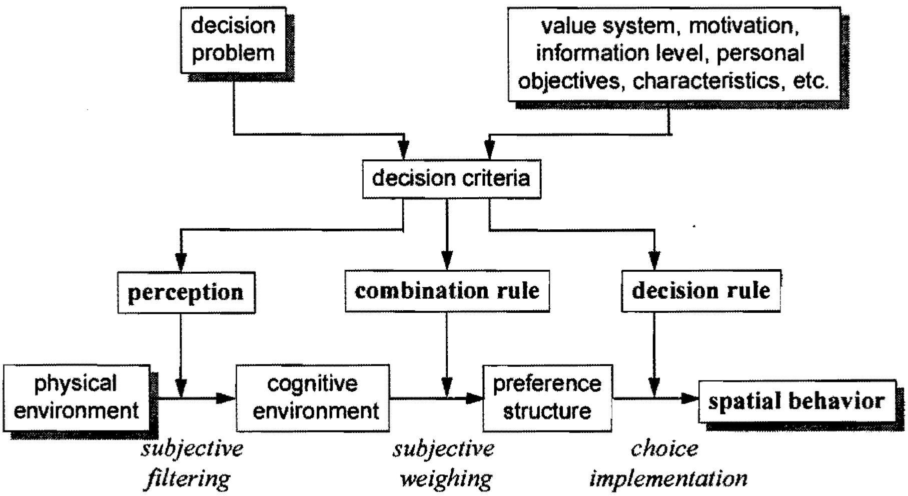
"Dominant questions in leisure research are: Who does what and how often? What factors affect leisure preference and choice? Is leisure demand predictable?" (Stockdale, 1989, p.121). For this study, we need not only analyze the role of preference in the choice process, but also see if preferences and their origins can be influenced by planning, and whether this can be measured. In other words, we need to know how and to what extent potential programs affect the individual consumer's preference and whether this subsequently brings about the desired behavioral change.

As was expressed in the introductory section of this chapter, a number of studies (cf. Lieber & Fesenmaier, 1984; Louviere & Timmermans, 1990; Dellaert,

1995) in leisure, recreation and tourism have focused on the relationship between background variables and preference, or on how preference and choice are related. The application of preference and choice studies in the field of leisure, tourism and recreation has been limited. In other areas of planning, modeling approaches that focus on decision-making processes have been used more extensively since the 1980s. Examples are transportation (cf. Ben-Akiva & Lerman, 1985; Anderson *et al.*, 1992) and retail planning (cf. Timmermans, 1982; Oppewal, 1995). Indeed, the individual (or household) decision where to go shopping, which route to take, where to buy a house, etcetera, are important aspects of retail and infrastructure planning. However, in comparison with the decision where to conduct recreation, these decisions are usually more habitual and influenced by a limited availability of choice opportunities. In other words, research on preference and choice decisions would even be more critical to leisure and recreation planning. It is therefore remarkable that this has been largely neglected.

The preference and choice approaches assume that individual choice behavior depends on preferences and choice opportunities. The latter reflect the (local, regional) supply structure, the former are assumed to be more or less stable, at least in the short run, independent of market conditions. By modeling these preferences, one would be able to predict choice behavior under new conditions. In addition, if preferences would vary with (demographic, socioeconomic, spatial) background variables, models at the individual or market segment level could be estimated to account for this heterogeneity. The conceptual model that underlies most of the currently used choice models is derived from Anderson's information integration theory (Anderson, 1974; 1981; 1982). or Luce's choice theory (1959; Luce & Tukey, 1964). A conceptualization of this model for spatial behavior was developed by Timmermans (1982), as is shown in Figure 4.1. The model stipulates that behavior is the outcome of a cognitive decision process, in which knowledge, availability, subjectivity and perception play a role. The individual chooses from a set of alternatives. This choice set contains all the choice options known by the consumer and hence will be limited. Individuals are not necessarily familiar with all available choice options in their direct environment, nor is their information necessarily perfect. Personal experience, personal interests and motivation limit the knowledge of the complete set of choice options. For example, families with children may fail to perceive any alternative beyond the child-friendly theme parks they normally visit, regardless of their attractiveness. Geographical boundaries can also limit the set of options to consider. Alternatives just across the state line or country border may be unknown, however near geographically. The subjective filtering process determines which alternatives will be considered.

Figure 4.1 Conceptual model of information integration and spatial behavior



source: Timmermans, 1982

The alternatives are perceived as bundles of features, usually called attributes. Attributes are like variables and can thus take on different values, such as the cost of a product, the travel time to a destination and the availability of certain facilities. Product characteristics are described by these attributes. The preference and choice approaches directly link these attributes to choices. The individual is assumed to subjectively perceive a choice alternative by its (distinct) attributes and to subsequently arrive at an overall preference judgment of the alternative by integrating his/her separate attribute evaluations. This integration process is highly subjective; according to the importance the individual assigns to the attributes, individual-specific part-worth utilities are derived. These part-worth utilities express the individual's weighted evaluation of an attribute level.

Individuals are assumed to use certain combination rules to weigh and process the attributes of the choice alternatives. Combination rules can be either compensatory or noncompensatory. When a compensatory rule is applied, a low appraisal of a specific feature can be compensated, at least partially, by a high score on one or more other attributes. The use of noncompensatory combination rules implies that a low appraisal cannot be compensated, and will therefore induce rejection of the choice alternative. The preference utility value of the alternative is a function of the part-worth utilities of its attributes. When a compensatory combination rule is used, an additive function is applied: a low part-worth utility can be compensated by a high one. Noncompensatory combination rules are associated with a multiplicative function: low values of an attribute level cannot be compensated with another attribute.

A preference structure is crucial to finally arrive at a choice decision. A decision rule determines which alternative is chosen, and thus links preference to choice. Usually, the decision rule assumes utility-maximizing behavior: the most preferred alternative, i.e. the alternative with the highest overall utility will be chosen. In summary, the following phases describe a consumer's choice decision process. First, the consumer perceives the attributes to have a certain value. Second, the perceived value of each attribute is evaluated in terms of its attractiveness. Third, the separate attribute evaluations are combined into an overall evaluation or utility of the alternative, leading to a preference function which positions the choice alternatives on a scale of overall preference. Finally, the alternative with the highest overall utility is selected.

4.4 Constraints to leisure behavior

4.4.1 From barriers to constraints

Much of the behaviorally based leisure research is focused on why people conduct leisure activities, the background of choices and why people choose certain alternatives. Constraints and barriers research has traditionally been involved in the flip side of the coin, addressing the question why people do *NOT* participate in recreational activities. This stream of research has been concerned with factors that hinder certain behavior, instead of facilitate or cause behavior. As has been expressed earlier, this study focuses on planning programs. Therefore, from a practical point of view, we need to concentrate on the question if any of these constraints, and thus their alleviation, are within the scope of planning.

Originally, social welfare based concerns motivated the study of leisure barriers, interested in causes and consequences of recreation non-participation. Research was mainly supply driven, focusing on factors causing non-use of public recreation facilities, such as parks, playgrounds and other public space (cf. Outdoor Recreation Resources Review Commission, 1962; Ferriss, 1962). Many studies concentrated especially on non-patronage of the less fortunate groups, as these were the target groups of social welfare policies. Barriers were defined as the intervening factors between desire (preference) and recreation participation. The main task of barriers research was to identify these barriers and to indicate how they were to be alleviated by social policies. Causes of barriers were to be found in socioeconomic variables. Surveys differentiated participation in particular activities by demographic and socioeconomic background variables such as age, income, gender, health status, race (in the US), place of residence, and household characteristics. Constraints were identified by correlating these variables with measures of participation. When demand was affected negatively, barriers were identified. No theory underlying the actual influence of barriers was used. As such, the focus was on collective behavior, not on individual participation. Barriers research did not concern with the question of how those barriers affected participation, nor were variables such as recreation needs and desires, preferences and sought benefits involved (Goodale & Witt, 1987).

From the late 1970s onward, an important shift in focus and conceptualization of non-participation research has taken place, as represented by a change in terminology. Instead of recreation barriers, researchers now refer to leisure constraints. The term barrier (Crawford & Godbey, 1987; Jackson, 1991a/b) fails to capture the complete background of constrained leisure.

Moreover, using the term barrier tends to direct the attention to a factor that intervenes between preference and participation. Now, a more complex and comprehensive range of constraining factors is identified, including factors that are not necessarily insurmountable, or affect the decision process before preference has been formed. For instance, Godbey (1985) identified lack of awareness as the most important constraint to participating in public leisure services, or certainly as the most cost-effective to be alleviated. This constraint clearly operates before the forming of preference, and could be overcome with relative ease. Constraints are now regarded as factors that not just hinder participation to recreation, but that may have an influence on the entire leisure choice decision process.

The substitution from the term recreation into leisure constraint is also an implication of the wider conceptualization of constraints. While recreation refers to the supply and activity side, and thus to patronage for public recreation facilities, leisure includes many other aspects as well, such as satisfaction, benefits, and experience. Moreover, a wider variety of activities is included in leisure. Leisure encompasses the whole array of voluntary, non-obligatory behavior conducted in free time, whereas recreation comprises a specific range of outdoor activities. Social-psychological perspectives on non-participation research caused a shift of focus toward individual consequences of leisure. More interest was expressed in how people feel about what they are participating in, as opposed to simply taking part in the activity itself. For instance, the identification of barriers to leisure enjoyment (cf. Witt & Goodale, 1981; Francken & Van Raaij, 1981) meant that a new dimension was added. The terminology shift also marks an important shift from the supply and activity-based approach to a demand and choice decision-oriented paradigm. Constraints are now defined to limit people's ability to participate in leisure activities, or to reach a satisfactory level of leisure benefits. Any factor that limits or inhibits participation in a given leisure pursuit may be termed a constraint (Raymore *et al.*, 1993). So, not only reasons for non-participation are explored by constraints research, but also latent demand, and reasons for non-satisfaction.

4.4.2 Constraints in time-space geography

The constraints approach finds its origin in time-space geography (Hägerstrand, 1970; 1975; Thrift, 1977a/b; Pred, 1986). Hägerstrand opposed the idea that manifest behavior is the outcome of preferences and free choice. Time and space are considered as scarce resources, and constraints of time and space limit feasible daily activity patterns. Individuals engage in activities with objectives and intentions, e.g. to achieve relaxation, to have a good time, to make others have a good time, to seek leisure benefits. Activities are the means to achieve these goals; however, goods and materials are needed. Moreover, activities have a spatial as well as a temporal component: they require time and space. Behavior in time and space is conceptualized as a series of activities, carried out as part of a project to realize the objectives set.

All individuals have their position in time and space. Any continuation of positions, or series of activities, forms a time-space path: a three-dimensional array of consecutive positions. Paths go via stations such as the house, the place of work, shops, and recreation destinations; these stations are nodal points where individual time-space paths join those of others. Complex webs of paths can be identified when the time-space behavior of groups of individuals is analyzed. Individuals paths are not isolated; they are joined to form bundles at the stations, or during transportation (on the train, on the road for instance). Bundlings are synchronizations and synchorizations of individuals' activities and of institutions, organizations, etcetera.

A number of fundamental aspects underlie the constraints that limit the bundling of paths. Obviously, human beings can only be at one location at a given time, and multi-tasking capacities of individuals are limited. Furthermore, activities have a certain duration, and transportation between different locations consumes time. Size and capacity of places limit the number of activities that can be carried out. The interaction of the individual and the (social, physical) environment can be explained as a problem of coordinating and allocating paths. Time-space paths of different individuals, institutions, etcetera, require bundling to enable certain activities. For example, time schedules of the family members need to be coordinated to go on a day- trip together, and so must the day-trip destination be available on the most convenient moment for this family.

Considering these aspects, Hägerstrand distinguished three constraint types. First, *capability constraints*, which relate to the human biological and physical condition and scarcity of time. Physical necessities such as eating, drinking, sleeping, limits of space and time constrain behavior. Secondly, *coupling constraints*, which refer to the individuals' synchronization and synchorization. Activities depend on the allocation of other people and things (e.g., tools, modes of transport). Thirdly, *authority constraints* are constraints inflicted by norms and values, law, authorities, etcetera. For instance, accessibility of areas, opening hours, legal limitations will cause these constraints.

These constraints largely affect behavior in time and space, but must not be regarded as determinants of behavior. Constraints determine a framework of opportunities within which the individual can make choices. As such, constraints reduce the number of feasible choice alternatives. Time-space geography uses constraints research to determine how far this opportunity set has been restricted, and thus conceptualizes constraints as absolutely precluding choice.

In Hägerstrand's approach, individual preference and choice do not come into play. The set of feasible options is reduced, but, unless this set contains only one element, there will be a choice opportunity among the feasible options. We therefore require a theory on how the final selection among these options is made. Moreover, Hägerstrand does not consider the possibility of adaptation to constraints. Constraints may facilitate other options, or be negotiated against certain elements of the choice alternatives.

4.4.3 Typologies of leisure constraints

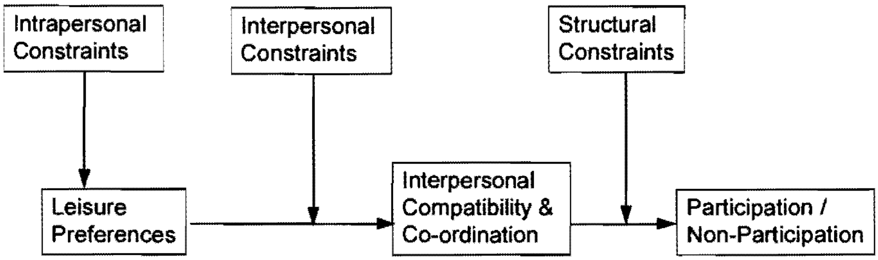
Typologies of constraints such as Hägerstrand's, enable one to gain more in-depth information on the precise nature of the constraining factors. Policy, planning and management can adjust their strategies (e.g., to increase patronage) according to constraint type. Searle & Jackson (1985), Howard & Crompton (1984), and Godbey (1985) believe that a classification of constraints can help managers to identify constraints that are within their jurisdiction and those which are beyond their control. With the change of orientation from the supply-driven approach to a more demand-driven approach, a wide variety of types and typologies of constraints were distinguished. Jackson & Searle (1985) and Jackson (1988) reviewed a wide range of barriers and constraints studies. These studies involved classifications of types of barriers (constraints) and of constraint typologies. A constraint typology distinguishes dimensions of constraints, and designates specific factors that influence behavior. Classifications have been made either conceptually or empirically, the latter mainly through factor analysis (Witt & Goodale, 1981; McGuire, 1984; Henderson *et al.*, 1987; Wright & Goodale, 1991; Jackson, 1993).

The most common conceptual distinction is between *internal* and *external* constraints, i.e. attributes of the individual versus those of the environment (Francken & Van Raaij, 1981). Others have recognized *personal* and *social* constraints (Boothby *et al.*, 1981), and *motivational* versus *physical* constraints (Howard & Crompton, 1984). A distinction between constraints *within* and *beyond control* has a large overlap with the internal/external dichotomy. That is to say, constraint-alleviating policy should mainly deal with external constraints. Exceptions however exist. Lack of time could, for instance, be identified as an internal constraint, but can nevertheless be within control of planning (e.g., by changing opening hours). The internal/external distinction is, however, not always clear; for example, lack of money could be explained both as an internal and as an external constraint. Even so, it is questionable if any constraint can be identified as internal. For most purposes, the *within/beyond control* distinction would be more useful than the internal/external one.

A number of authors identified constraints that not necessarily intervene between preference and participation. Godbey (1985a) proposed a sequential distinction among constraints. Awareness, or the lack of it, is the pre-eminent constraint identified in his model. Next, interest, or the lack of it, comes into play. Other constraints can operate only beyond awareness and interest. Henderson *et al.* (1988:1) recognized *antecedent* constraints empirically. They defined these as "attitudes associated with a barrier such as personal capacities, personality, socialization factors, interest, etc.". These antecedent constraints are opposed to the intervening constraints (between preference and choice or participation). Crawford & Godbey (1987) recognized, *intrapersonal* constraints and *interpersonal* constraints. These two types together are roughly comparable to Henderson's antecedent constraints. Crawford & Godbey refer to the constraints that intervene as *structural* constraints, where Henderson *et al.* (1988) have called these *intervening* constraints. Crawford & Godbey's *structural* constraints include family life-cycle stage, family financial resources, season, climate, the scheduling of work time, (perceived) availability of opportunity, and reference group attitudes concerning the appropriateness of certain activities (p.124). The *intrapersonal* constraints involve individual psychological states and attributes which interact with leisure preferences rather than intervene between preferences and participation. Examples include stress, depression, anxiety, religiosity, kin and non-kin reference group attitudes, prior socialization into specific leisure activities, perceived self-skill, and subjective evaluations of the appropriateness and availability of various leisure activities (p. 122). *Interpersonal* constraints are the result of interaction between individuals. Preferences of other members of the household may be mutually influencing and thus influence the choice decision process. Joint preference of spouses, or of parents and their children, can be the product of intrapersonal constraints.

Crawford *et al.* (1991; Raymore *et al.*, 1993) integrated the three constraint types (structural, intrapersonal and interpersonal constraints) into a single integrated and sequential model (see Figure 4.2). They stated that constraints are encountered hierarchically. First, leisure preferences are formed under influence, or the absence of, intrapersonal constraints. Next, after the preference structure has been established, one experiences the interpersonal constraint. It involves the question with whom to undertake the activity, which will sometimes be an absolute necessity. As such, this constraint type refers back to Hägerstrand's coupling constraint. This constraint type needs to be overcome before structural constraints can be encountered.

Figure 4.2 A model of leisure constraints



source: Crawford *et al.*, 1991

The Crawford *et al.* model raises a number of questions. First, it is not clear why only intrapersonal constraints can affect preference. Interpersonal constraints may also influence the decision process in an earlier stage. The composition of one's household, or any usual travel party, may cause that certain alternatives are not considered and thus affect the preference structure. Having children in the household is a typical example of a potential *interpersonal constraint*. However, it is not only the outcome of co-ordination of the children's preferences and their parents' that underlies the final decision. The presence of the children may influence the parents' preference forming in an earlier stage. Similarly, spouses adapt their own preference to that of the other, and not just co-ordinate or negotiate them. In other words, there is a certain influence of the *interpersonal constraints* on leisure preferences. Secondly, some constraints that Crawford *et al.* identified as *structural constraints*, may also affect preference forming. Factors such as financial resources or a certain time budget may be directly constraining, but in many cases compensation is possible. It may depend on the strength of a choice alternative's preference value if the activity is indeed impossible. When this value is extremely high, thus when the choice alternative is highly attractive, the individual might be willing to pay an extremely high price. In those cases, there is an interaction between the constraint and preference.

The mentioned examples suggest that constraints can be placed anywhere in the choice decision process. Financial constraints, for instance, can either have an influence on preference, or intervene between preference and choice. Therefore, we can conclude that the substance of a constraint does not determine its nature or status.

4.4.4 Adaptation and substitution

Jackson & Searle (1985) made a conceptual distinction between *blocking* and *inhibiting* constraints. The first absolutely preclude participation, the latter merely serve to inhibit the ability to participate to a certain extent, depending on circumstances. They argue that the status of a constraint may differ from person to person. While older people, or the handicapped, may be easily constrained to leisure activity by lack of partners, a younger person may have less problems with recreating alone. Similarly, Boothby *et al.* (1981) used *absolute* versus *relative* constraints. Iso-Ahola & Mannell (1985) distinguished between *permanent* and *temporary*, where the strength of a constraint may depend upon circumstances.

Beyond the *strong/weak* dichotomy, differentiations have been made between constraints *that prevent participation* and constraints that *do not prevent participation*. As Crawford *et al.* (1991) and Raymore *et al.* (1993) demonstrated, the structural constraints, that operate in a late stage of the process, have the most blocking character. The other constraints appear to operate less strongly. Shaw *et al.* (1991) and Kay & G. Jackson (1991) found that constraints do not always prevent participation. Both studies report of activities that participants describe as constrained, and where participants are conscious of constraints but where these are overcome. There are even constraints that show no effect on participation. Kay & G. Jackson (1991) suggest that an individual perception of constraints does not necessarily mean non-participation. To achieve a desired level of participation people may go through great efforts to overcome constraints. Contradictory as it may seem, one could even expect a positive correlation between perceived constraints and participation. Individuals experience constraints in relation to certain activities; constraints are reported for "susceptible types" of activities. Shaw *et al.* (1991) argue to this respect that the alleviation of these constraints would not necessarily lead to increased participation.

Shaw *et al.* (1991) suggest further that the explanation of the low predictive ability of constraints may lie in existing constraints that researchers had not asked about, or perhaps in constraints which people do not recognize as such (p.297). Cognitive factors may play a role here: respondents are clearly biased to perceive the constraints associated with activities they are familiar with, and participate in, despite constraints. If strong efforts are exerted to overcome constraints successfully, apparently adaptation has been possible.

The cognitive factor was picked up by Jackson *et al.* (1993) and related to a perspective of cognitive dissonance: attitude-behavior issues are typically settled in a way that reduces psychic discomfort. Activities that one would like to engage in but are not obtainable, are devalued in terms of preference (p.9). This cognitive dissonance attitude is one way of adapting to constraints. Jackson *et al.* (1993) describe a process of negotiation through leisure constraints, which modifies participation rather than forecloses it. Scott (1991) described some strategies that individuals may adopt to adapt to constraints: acquisition of information about limited opportunities; altered scheduling to adjust to group membership (to overcome coupling constraints), and skill development. Kay & G. Jackson (1991) reported saving money (to overcome financial constraints). Negotiation can fail, so that the outcome of these efforts may indeed still be non-participation, but only in few cases. Reducing the frequency of participation, or substitution with other behavior may be options.

A meaningful distinction can be made between constraints that have a direct influence on choice and participation, and constraints that undergo a negotiation process within the decision process. The latter type allow for adaptation, the former intervene between preference and choice and thus preclude participation in the leisure activity.

4.5 Constraints in the choice decision process

The assumption that individuals can form their preferences for choice alternatives and choose the alternative they prefer does not hold theoretically. Constraints may influence the choice process in different ways. First, certain constraints may precondition choice. Moreover, constraints may influence the choice process by blurring perception. Furthermore, the combination rule is influenced by time or other constraints facing household and individuals. Finally, constraints may interfere between preference and final choice. For example, family households are constrained in their recreational behavior by the presence of little children. The family's decision maker will at first only consider sites that feature facilities for children. Moreover, conditions on attributes of the trip such as mode of transport, distance, travel time, safety and parking facilities will be set according to the family situation: no complicated bus-train-bus journeys, not too far away, only with guarded playing facilities etc. In other words, because of the presence of the children the alternative is out of the question beforehand. If the parents could have the children stay home with the baby sitter, they would consider a different set of choice alternatives and requirements for various attributes of the trip. Due to limited financial resources, an expensive alternative for instance may be reduced in preference value, but if this is compensated by a very high level of (expected) satisfaction this alternative may be chosen nonetheless. Thus, adaptation is possible.

Individuals that do not participate in a certain activity due to constraints, may participate in other activities. For instance, because of the presence of young children, activities such as visiting a museum may be excluded. Children thus constrain museum participation. However, this same presence of children, may increase the propensity to visit an amusement park, which would not be done without children. In other words, children operate as a constraint for a certain activity, but as a facilitator, or an opportunity, for another activity. Viewed from the individual's viewpoint, an adaptation process has taken place: leisure activity is not excluded, but the interaction of preference and choice has brought forward another choice decision. From a planner's point of view, being interested in participation in that particular destination, the constraint has still precluded that particular choice: the site has not been chosen. So, it depends on how the leisure activity is defined whether a factor can be identified as a constraint. In the above case, children do not so much operate as a *leisure constraint*, but more as a *museum constraint*.

Constraints research has evolved from the study of factors precluding participation in desired leisure activities, into the analysis of complex mechanisms within a hierarchical choice decision process. Several types and typologies have been distinguished, of which the *adaptable/non-adaptable* dichotomy is the most relevant for this study. This distinction expresses whether constraints can be negotiated, and whether constraints can be alleviated. Thus, it covers the whole span of typologies from *within/beyond control* of planning and management through blocking/inhibiting to *preventing / not preventing participation*. However, empirical evidence to support such a conceptualization has been limited.

Another meaningful distinction of constraints is based on the question whether planning interventions can affect these constraints. Constraints originating from personal taste and aspirations are the least likely to be influenced: lack of time or money, or special requirements for children can possibly be overcome by policies. However, constraints not to be influenced directly should not be neglected. Interactions of these constraints with other constraints, or with preference variables, can occur. Theoretically, any constraint can be affected by planning, either directly or indirectly. So, the relevant classification here would be between those that are to be influenced by direct actions, and those that will need to be alleviated by affecting the negotiation processes within the decision process, which also involves preferences.

Two conceptual models of choice behavior were discussed in this chapter. Timmermans' model (1982), Figure 4.1, explicits the forming of preference within the choice decision process. Constraints are implicit within the elements of the process. Information constraints, that determine awareness of choice options, play an important role at the subjective filtering of all available alternatives. In fact, the cognitive environment, or all perceived choice alternatives, is the outcome of a simple calculation: the physical environment minus the alternatives not known as caused by information constraints. Other constraint types can also be regarded as implicit in Timmermans' model. Constraints that are muddled through a negotiation process play a role within the combination rule, affecting the forming of preference. The constraints that interfere between preference and choice play an implicit role in the decision rule/choice implementation step. The model of Crawford et al. (1991), Figure 4.2, makes the role of constraints explicit. Here, the forming of leisure preferences is considered as a given phenomenon. One could picture the information integration model of Timmermans as the preceding process. The sixth chapter of this thesis presents a conceptual model that integrates the preference and constraints approaches.

To be able to estimate the (potential) future demand for a projected choice alternative, we require a valid identification of a constraint's substance (e.g., financial, temporal) and its status or nature (e.g. direct influence, indirect influence). Moreover, information on individual consumer preferences is required, and insight in how these elements are related. Ultimately, the objective of any policy strategy is to change choice behavior. Research should support planners in their planning decisions by forecasting the demand for choice alternatives and giving insight in the competition between choice alternatives with a variety of choice options. In the next chapter, we elaborate on the research methods that were developed in order to collect this information.

5 Measuring Leisure Behavior

5.1 Introduction

Whether certain theoretical approaches are useful to planning depends on the availability of the information these approaches require. Concepts such as preferences and constraints can only be made operational if measured adequately. In this chapter, we review relevant methodologies and analyze whether these can detect, measure and quantify the elements of the leisure decision process. More specifically, we concentrate on measuring procedures for preferences and constraints. Pertinent questions are posed to gain insight into the choice decision process: how are constraints and preferences related, do interactions occur, and whether certain negotiation mechanisms play a role. The information enables us to model leisure behavior, and thus to assess the course of developments after planning interventions.

Studies on preference and constraints can be related to two separate approaches of exploring future demand. Conventional and straightforward data collection methods have been applied to identify constraints (Jackson, 1988). In order to measure preference and behavior, a greater number of methods has been used, among which some complicated and sophisticated ones (Oppewal, 1995). This chapter reviews procedures for identifying and measuring preferences and constraints.

5.2 Qualitative identification methods

As was noted in chapter 4, we assume that leisure choices are the result of a cognitive decision process. The individual's perceptions of choice alternatives and individual constraints influence this process. The individual chooses from a set of alternatives, i.e. various attraction sites, and different transport modes. He/she subjectively perceives a choice alternative by its distinct features and subsequently goes into the process of (subjectively) integrating the factors of the choice decision process. A first step in a model building procedure is to identify these relevant facors.

The identification of relevant factors in the choice process is usually done by examining the literature. Previous studies help to identify the attributes pertinent to the choice involved, naturally provided that adequate studies are available. Oppewal (1995) and Dellaert (1995) give examples of this procedure. If, however, the existing literature does not suffice, or no appropriate studies can be found at all, other methods of identification need to be applied. Such an information gap may occur when the subject of study is relatively new, as is the case with transport mode choices for leisure.

In this section, we discuss two methods that were applied to identify the elements of the choice decision process. Timmermans & Van der Heijden (1987) give an overview of methods that can be used for this purpose. The *repertory grid* method (cf. Kelly, 1955; Hallsworth, 1988) and *decision plan nets* (DPN; cf. Bettman, 1979; Park & Lutz, 1982) are methods to identify the various aspects of the choice process, while accounting for the subjectivity mentioned above. Repertory grid is used for the identification of attributes of choice alternatives. Decision plan nets can be utilized to identify the strategies that individuals apply in arriving at some choice and to explore the negotiation between elements in choice process, for example among attributes and between constraints and attributes. The methods have been used previously in marketing and retail analysis (cf. Hallsworth, 1988), and also in the context of leisure and recreation research (Timmermans & Van der Heijden, 1987).

5.2.1 Repertory grids

The repertory grid method explores individuals' perceptions by identifying the characteristics by which individuals distinguish between objects. Kelly (1955) developed the method for therapeutical purposes; it aimed at reducing the influence of therapists, preventing the intrusion of interviewer bias. Later, others adopted the method to collect information on individuals' subjective perceptions (cf. Hudson, 1980; Hallsworth, 1988). Thus, the method was applied to explore the features of choice objects that individuals perceive while choosing between different alternatives.

Kelly's theory of personal constructs aimed at explaining how personality, preference, and behavior are structured. Based on experience, each person adopts his own yardsticks or constructs of the environment. These personal constructs together represent the individual's perceptions of the real world. Any new situation, any decision, is viewed through the subjective filter of the personal constructs. Naturally, perceptions can be modified. Kelly's view on personality can be compared with a scientist's inductive method. Based on experience (earlier research, literature), a scientist conceives a set of hypotheses. Through empirical findings, by trial and error, these are either rejected or not. New hypotheses can be developed, after which the process starts again. Repertory grid research in the applied social and spatial sciences has aimed at exploring the personal constructs of choice alternatives, i.e., the aspects considered while making a decision. The personal constructs are represented by individually perceived features of choice alternatives that are relevant to the decision to visit a site or to buy a product.

The identification of the relevant factors is accomplished with a technique of having the respondents characterize each alternative on its distinct and contrasting features. Usually, a set of choice elements is constructed (for instance, recreation sites in Van der Heijden & Timmermans, 1988; shopping centers, Timmermans *et al.*, 1982a/b; shoe stores, Coshall, 1985; food stores, Opacic & Potter, 1986). In a repertory grid questionnaire, these alternatives are presented to a respondent in sets of three. The respondent is then asked to pick the most different alternative from each triad, and to name the features on which it contrasts with the other two. Repertory grid interviews can be performed quite easily and are well understood by the interviewee. Hallsworth (1988: 53) stated: "The overriding advantage is that the method has objectivity and does not permit the researcher to impose ideas upon the subjects." Another advantage of the method is that it requires only small samples: in the literature reviewed, sizes range from fifteen (Van der Heijden & Timmermans, 1988) to fifty (Coshall, 1985). A sample size of some 40 respondents is required to perform additional analyses, such as factor analysis or principal components analysis. For exploratory purposes, a size of 15 is sufficient.

A drawback of the method may be that interviews are time-consuming. However, the benefit of a small sample may outweigh this inconvenience (Hallsworth, 1988). Another disadvantage of the method is that the alternatives are drawn randomly to construct the triads. Certain alternatives, or combinations of alternatives, can therefore occur too frequently, and others not frequently enough. As a result, certain distinctive features of the alternatives may not be mentioned at all. Ideally, the researcher should have control over the frequency of alternatives and combinations.

5.2.2 Decision plan nets

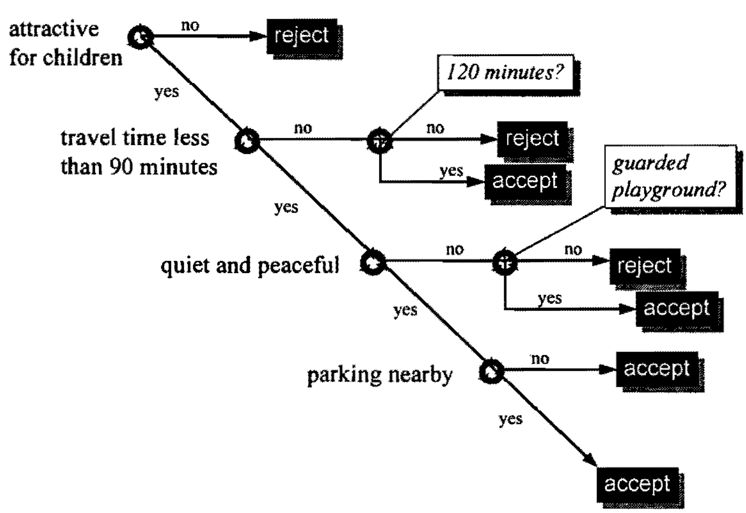
The *decision plan nets* (DPN) method has been used to identify an individual's strategies to choice behavior. It has previously been applied to home purchasing (Park *et al.*, 1981; Park, 1982), and recreational destination choice (Timmermans & Van der Heijden, 1987). The decision plan net attempts to represent decision making processes in terms of the attributes that are considered important, the sequence in which these attributes are considered, and the specific role of the attributes in the decision process. The method originates from marketing research studies. Bettman (1970) introduced the concept of decision nets to describe and predict individual consumer choice. He defined a decision process as (p. 370): "(...) a net through which an array of cues passes. Alternatives are taken at the choice points in the discrimination net depending upon the value of the cue that point processes." A decision process consists of several subprocesses, the cues, in which the attributes are considered separately, and where possible in combination. The cues thus represent the conditions that individuals attach to the process of deciding to buy a product. These cues fall into three categories: choice object attributes, external environmental attributes, and internal cues or cognitive variables. The latter represent the individual perceptions of attributes. Bettman found that the product accept-reject decisions of an individual consumer were modeled quite well by a decision net of cues.

Park *et al.* (1981) further developed the method by introducing the decision plan net. It was defined as "(...) a decision maker's detailed sketch about intended strategies toward future decision situations." Whereas Bettman's notion focused only on evaluating alternatives and choice, Park *et al.* covered the whole hierarchy of strategies, from problem recognition to behavior. Moreover, they developed a method to make respondents recognize (trade-off) strategies that they did not realize previously. This was obtained by having the decision makers examine and compare some choice alternatives. Hence, Park's decision plan net comprises a broader spectrum of the intended decision than Bettman's.

The decision plan net results in a list of characteristics (dimensions) of choice objects and their associated role within the evaluation process. Respondents specify the criteria they attach to a choice problem. These are expressed as attribute conditions. Graphically the decision plan net is illustrated as a net (see Figure 5.1) in a hierarchical branching structure. The decision to accept or reject an alternative is represented by a sequence of subdecisions on the separate attributes. The branches depict the subprocesses, and represent the result of not fulfilling the stated condition while all other conditions are fulfilled: rejection, acceptance, or conditional acceptance. In the latter case the branch is extended with a new condition. Park *et al.* (1981: 36) named the three types of dimensions that can be assigned to the attributes as follows:

1. *Rejection inducing dimensions (RID's)* refer to noncompensatory combination rules. An alternative will be rejected if a particular attribute does not meet an individual's conditions. An example of this dimension is given in Figure 5.1: *'attractive for children'* is a necessary predicament of any given trip. When this requirement is not fulfilled, the alternative is immediately rejected. In the same example, the *'travel time less than 90 minutes'* predicament does not operate as a rejection inducing dimension first. The hypothetical respondent here is apparently prepared to extend his value to 30 minutes more. However, that is the final offer, and not fulfilling the adjusted demand will result in rejection of the alternative.
2. *Trade-off dimensions* refer to compensatory combination rules. Absence (or unsatisfactory presence) of the attribute can be compensated by the presence of another attribute. Apparently, the *'quiet and peaceful'* demand in Figure 5.1 is not that strict, it can be negotiated against a guarded playground.

Figure 5.1 Example of decision plan net



3. *Relative preference dimensions* make the alternative more desirable. Acceptance or rejection of the alternative however does not depend on this attribute. The hypothetical respondent of Figure 5.1 mentioned *'parking*

nearby' as one of his demands. However, without fulfilling this demand, the alternative is nevertheless acceptable.

Apart from identifying tradeoff strategies to choice behavior, the decision plan net enables the identification of constraints. These are indicated indirectly by the rejection inducing dimensions. The procedure of a decision plan net interview was described in detail by Park *et al.* (1981: 45-47). The net constructing task requires 15 to 35 minutes and is easy to implement.

5.3 Measuring constraints

In constraints research, either constraints or dimensions of constraints are distinguished. Traditionally, procedures to measure barriers and constraints approached behavior on an aggregate level, thus not on the level of the individual consumers' decision process. As was noted in chapter 4, barriers research was concerned with identifying intervening factors between desired and conducted recreation participation (cf. Outdoor Recreation Resources Review Commission, 1962; Ferriss, 1962). Socioeconomic variables indicated causes of barriers. Surveys differentiated participation in particular activities by demographic and socioeconomic background variables; correlations of these variables with measures of participation were used to identify factors affecting demand. Barriers were found when demand was affected negatively.

With the conceptual shift of focus of the late 1970s, from recreation barriers toward leisure constraints, more sophisticated measuring procedures were applied, and descriptive and analytic statistics gained an increasing popularity. The conceptual definition of constraints as such poses researchers with problems of identifying them. For instance, constraints are conceived to exist primarily for individuals who do not participate. Second, when participation is ceased, or when participation in a certain leisure activity is replaced by another activity, constraints must have been in operation. Third, not reaching the desired benefits of leisure may find its origin in constraints. The reasons and backgrounds for either of those can be identified as constraints.

Widely used is a straightforward approach, in which respondents are asked directly for reasons for non-participation or ceasing participation. Consequently, these are interpreted as constraints, and undergo further analysis. For instance, Jackson & Dunn (1991) report on the *Public Opinion Survey on Recreation,* administered by *Alberta Recreation and Parks* in 1984, and a broadly similar *General Recreation Survey,* that was issued in 1988. Here, respondents were asked to evaluate the relative importance of selected reasons for not participating or ceasing it on a rating scale.

In a number of studies, factor analysis was used as a tool to define the dimension of constraints (Jackson, 1988: 209), and thus not only to identify, but to classify constraints as well (Witt & Goodale, 1981; McGuire, 1984; Henderson *et al.*, 1988; Wright & Goodale, 1991). Furthermore, cluster analysis was applied to support the recognition of patterns of constraints among different segment groups (Jackson, 1993). However, it was observed as a major drawback of this factor analyzing of constraints that factors, as derived from different studies, are incomparable. Jackson (1988) compared a number of studies which had applied factor analysis, and noted that differences in factors identified are mainly attributable to the different samples to which the surveys were administered, and to the range and content of items in the scales used. Therefore, it is impossible to make generalizations as far as constraints and dimensions of constraints are concerned.

Moreover, the conventional and straightforward method of data collection raises questions of subjectivity and emphasis on interpretation (Jackson, 1991). As Shaw *et al.* (1991) suggested, explanations of constraints may lie in constraints that researchers had not asked about, or perhaps in constraints which people do not recognize as such (p.297). Cognitive factors may play a role here: respondents are clearly biased to perceive the constraints associated with activities they are familiar with, and participate in despite constraints. If strong efforts are exerted to overcome constraints successfully, apparently adaptation had been possible to this constraint. Such will be reflected in the responses to a survey. The cognitive factor was picked up by Jackson *et al.* (1993) and related to a perspective of cognitive dissonance: attitude-behavior issues are typically settled in a way that reduces psychic discomfort. Activities that one would like to engage in but are not obtainable, are devalued in terms of preference (p.9). This cognitive dissonance attitude is one way of adapting to constraints.

5.4 Measuring preference and choice

Broadly, two schools of approaches to measure the influence of attributes in the choice decision process can be distinguished. This distinction is made on the type of data that is used. First, the revealed approach, derives utility values and attribute weights from observations of behavior in real situations. Revealed choices thus form the basis for modeling choice behavior. Data for revealed models are mostly derived from statistical sources, countings and participation figures (cf. a review by Witt & Witt, 1992), or *a posteriori* responses and evaluations in questionnaires. The stated approach, on the other hand, derives attribute weights and utility values from responses on hypothetical situations. Questionnaires are the main source to obtain stated data. Respondents are asked to state their *a priori* evaluations of attributes, attribute levels, or choice specified alternatives. Regression models are developed using these *a priori* responses. Table 5.1 summarizes the main characteristics of the stated and revealed choice and preference approaches.

A revealed model predicts future behavior based on past behavior. Revealed models therefore have the advantage of a relative close relationship with actual choice behavior, which would imply a high external validity. Models with high external validity have a good predictive power. However, there are a number of disadvantages to revealed preference and choice modeling, as summarized by Oppewal (1995). First, parameters for attributes cannot be measured independently. Many relevant characteristics are often correlated, e.g., price and quality, or size and variety. Second, usually only one observation per respondent can be made. Sometimes, the behavior under study is typically infrequent or only to be observed for a small population. This requires large samples and thus high cost for data collection. Third, there is no control over the composition of the choice set. Other, unknown alternatives may have been considered for choice, which may cause unexplainable biases in the parameter estimates. Fourth, responses can only be measured for existing alternatives and attribute levels. Potential impacts of planning initiatives and programs cannot be predicted, when these are beyond current domains of observation.

Stated approaches may therefore be useful to planning research. Among the stated approaches, we distinguish the compositional modeling approach from the decompositional approach. In the compositional approach, attribute evaluations are measured separately. Respondent consumers are asked to state how they value given attribute values, and to indicate how important they are, involving some rating scale or ranking table. Choices are then predicted based on an alternative's overall utility, which is derived from multiplying the attractiveness and importance scores across attributes. Green & Srinivasan (1990) listed a number of potential problems with the compositional method. First, respondents may have problems to separate attractiveness and importance. They will not be able to hold all else equal while evaluating separate attributes and coincidental personal experience may influence the evaluations. The specification of attributes, which is the researcher's responsibility, may be incorrect. For instance, when the same dimensions underlie different attributes, double counting will occur. Furthermore, the combination rule is specified by the researcher. Usually, respondents cannot express certain trade-offs among attributes. Finally, no decision rule can be detected; the likelihood of choice is not evaluated.

In contrast, in decompositional, or conjoint, modeling approaches importance and weight of attributes are derived from responses to specified choice alternatives. Thus, rather than measuring importance weights and attribute valuations explicitly and separately, the implied utility function is obtained by estimating the contribution of each attribute level to the overall evaluation, measured for experimentally designed profiles of attribute levels. A review of the conjoint approach is given by Louviere & Timmermans (1990). Characteristic of this approach is the use of hypothetical alternatives, on which respondents are requested to state their evaluations. There is a distinction between studies that have respondents rank or rate these hypothetical alternatives, and studies that have respondents make choices between the alternatives. The first group is referred to as stated preference modeling or conjoint analysis, the latter as stated choice modeling or conjoint choice modeling. Van der Heijden *et al.* (1989); Woodside & Carr (1988), Bojanic & Calantone (1990), and Carmichael (1993) give examples of stated preference modeling in recreation and tourism research. The studies of Louviere & Hensher (1983), Haider & Ewing (1990), Louviere & Timmermans (1992), Dellaert (1995), and Kemperman *et al.* (1996) are examples of stated choice modeling.

Conjoint modeling gives the researcher control over the alternatives and attribute levels to be presented to the respondent. Using statistical design methods, attributes and attribute levels are varied systematically in order to construct profiles that describe hypothetical choice alternatives. The researcher can construct and control the choice sets, and randomly assign these to the respondents. The use of hypothetical alternatives allows for several observations per respondent, as they can complete more than one choice task. One of the major advantages of conjoint modeling is the introduction of new elements in the hypothetical choice options. This allows the estimation of parameter values for new planning variables that are yet to be implemented. Consequently, choice simulations for the new situation can be conducted.

A drawback of the conjoint modeling approaches may be their lower external validity, as compared with revealed models. Actual choices may differ from responses to the stated, hypothetical experiments. This refers to the question whether respondents will behave in reality as they say they will; other factors, not specified in the experiment, may determine choice. Crucial to this respect is the researcher's model specification. The internal validity of stated preference models generally outperforms that of revealed models (Louviere & Timmermans, 1990).

Stated choice tasks offer several advantages over stated preference tasks (Oppewal, 1995). First, stated preference tasks are believed to have little resemblance to real behavior. In reality, people do not rate or rank alternatives, but make choices among different options. Second, stated preference requires to formulate ad hoc assumptions concerning the decision rule, to predict choice from preference ratings or rankings. With choice models, estimation on an individual level is more difficult. Choice models require a larger number of observations than models based on ratings data. However, an adequate segmentation of the data can largely overcome this problem for choice modeling.

Table 5.1 Comparison of preference and choice modeling methods

method	data source and collection	advantage	disadvantage
revealed choice/ preference	statistics, questionnaire; countings, participation figures	• high external validity	• attributes are dependent • problems with infrequent choices • no control over the composition of choice sets • only existing alternatives and attribute levels.
stated preference, composit-ional	questionnaire; preference scales for separate attributes (levels) and weights	• independent evaluation of attributes (levels)	• difficult to separate importance from attractiveness • specification of attributes may be incorrect • researcher specifies combination and decision rules
stated preference, decomposit-ional (conjoint analysis)	questionnaire; preference scales (rating/ ranking) of hypothetical alternatives	• control over alternatives and attribute levels • independent attribute levels • new options can be introduced • several observations per respondent • high internal validity • allows to estimate individual models	• questions of external validity • researcher determines decision rule (e.g., highest will be chosen)
stated choice, decomposit-ional (conjoint choice)	questionnaire; choice among hypothetical choice alternatives	• close to real world choice situation • control over alternatives and attribute levels • independent attribute levels • new options can be introduced • several observations per respondent • high internal validity	• questions of external validity

If we would want to predict the impact of acts of planning yet to be implemented, conjoint choice modeling is the most adequate approach. This approach allows an ex ante evaluation of any planning program specified. The relationship between hypothetical measures and their resulting effects on demand can be quantified systematically in an unbiased manner.

The conjoint or stated choice approach allows one to introduce new elements and measure consumers' preferences for such new elements. The method contains an implicit relationship between preference structure and actual choice, as choice responses are measured as the dependent variable. However, conjoint choice modeling, as any other existing preference and choice approach, does not explicitly considers constraints in the choice decision process. Behavior is regarded as being conducted in an unconstrained context. No barriers, obstacles or constraints to behavior are explicitly taken into account. Many leisure and recreation researchers have been concentrating on just these aspects, considering that constraining disturbances may occur during the choice process.

5.5 Procedure of conjoint choice modeling

Conjoint (choice) analysis focuses on measuring the part-worth utilities that individual consumers assign to attribute scores of choice alternatives. Building a conjoint choice model therefore involves measuring responses to experimentally designed, hypothetical choice alternatives. These are descriptions of potential and realistic alternatives.

Figure 5.2 Example description (profile) of a hypothetical day trip

Attribute	Attribute level	other levels
Park type:	Amusement Park	museum; zoo
Travel time:	60 minutes	30, 120 minutes
Entrance fee:	Dfl. 20	Dfl.10; 30

Usually, printed media are used for the representation of the choice alternatives; they are described by a number of attributes with their associated fixed values, refered to as attribute levels. Single alternatives thus described are usually refered to as profiles. A simple example would be a profile of day trip to a theme park, as shown in Figure 5.2. In stated preference experiments the profiles are ranked or rated on a preference scale.

Figure 5.3 Example description of a choice set

Park type:	Amusement Park	Zoo	**stay**
Travel time:	60 minutes	120 minutes	**home**
Entrance fee:	Dfl. 20	Dfl. 10	
your choice:	o	o	o

Choice tasks however involve a choice between alternatives. Choice sets are applied to have the respondent choose between two or more of those alternatives. These choice sets represent a realistic choice situation; usually there is a base alternative, to be chosen when none of the presented alternatives is attractive enough to pursue. Figure 5.3 shows such a choice set; here respondents are requested to choose between two specific alternatives and a base alternative. It involves the survey question: *"Which of the following would you choose if you were to select one of the presented alternatives?"*

Conjoint choice modeling has been applied to a wide range of problems, including tourism, leisure and recreation research: e.g, Haider & Ewing (1990) modeled choices for hypothetical Caribbean destinations, Carmichael (1993) did so for ski resorts, Dellaert (1995) had tourists state their choices for various activities at city trips, and Kemperman *et al.* (1996) used stated choice modeling for consumer choice of theme parks.

5.5.1 Design for independent estimation

Essential to the development of the conjoint model is the researcher's control over the model's attributes to enable their independent estimation. The researcher must ensure that any effect can be assigned to one variable alone, without interference of any other variable. A crucial step therefore in the modeling procedure is the variation of attribute levels: all attributes must vary independently. That is, in statistical terms, a research design is required in which correlations between all attribute levels are equal to zero.

One way of accomplishing this is the use of *full factorial* designs. There is, however, a major drawback to using such full factorial designs. Task size increases rapidly with increasing numbers of attributes and/or levels. (cf. Louviere, 1988). The size of such a design, i.e., the total number of attribute profiles to be considered by the respondents, equals to the multiplication of all attribute levels. The example shown in Figure 5.2, involving a 3^3 profile: 3 attributes with 3 levels each, would require 27 treatments to cover all possible combinations. Similarly, a simple model of 5 attributes with 3 levels each involves 243 alternatives, adding two more attribute again would increase the design to 3^7 or 2187 profiles. For a respondent of a stated choice experiment to consider such numbers of alternatives would be too time consuming, or simply infeasible. It can be expected that such a task would negatively affect the quality of responses. In order to maintain statistical independence with a limited number of attribute profiles, *fractional factorial* designs (cf. Montgomery, 1984) can be applied. That is, a fraction from the full factorial design is selected, which still enables one to estimate all attribute effects independently. Fractional factorial design techniques allow one to optimize efficiency by reducing the number of profiles in the design, while maintaining its statistical properties. For instance, we can downsize the 3^7 design (2187 combinations) to a fraction of 18 profiles, where all main effects can be estimated independently.

5.5.2 Design for interaction effects

In some cases, it may be useful to be able to estimate interaction effects of variables. Interaction effects take place when the combined occurence of variables gives an extra positive or negative effect to an alternative's utility. For example, entrance fee and travel time may both be attributes with a strong effect on theme park choice, and a low appreciation of one may be compensated by a high evaluation of the other, and vice versa. However, the joint occurence of the highly appreciated levels on both attributes may give an extra boost to the alternative's utility. In other words, when this particular theme park is cheap and nearby, it is more attractive than only the separate attribute levels 'low price' and 'short distance' might indicate.

Naturally, the estimation of interaction effects should again be completely independent of any other attribute of the choice model. The experimental design should therefore allow to estimate these interaction effects. Designs with these properties are typically larger in size than main-effects-only designs. For instance, while the 3^7 design mentioned in the previous section allows for the estimation of main effects with only 18 profiles, a minimum of 81 profiles is required to enable the estimation of a limited number of interaction effects. In that particular case, 10 interaction effects are allowed by this design. In order to enable all possible first order interaction effects, 243 profiles would be required.

5.5.3 Estimation

Following McFadden et al. (1977) and Ben-Akiva & Lerman (1985), stated choice modeling involves the estimation of a choice model. Usually, the multinomial logit (MNL) model is assumed to represent the choice data. Assume that a household is faced with some choice or consideration set A, consisting of I choice alternatives. Assume that park i ($i=1,2,...,I$) can be represented in terms of a set of K attributes X_{ik} ($k=1,2,...,K$). These attributes describe the positioning of the choice alternatives on the K choice dimensions of interest. The aim then is to predict the probability that alternative i will be chosen out of A, given this set of attributes.

Let us assume first that no interactions occur. That is, we assume that the choice behavior of interest is dictated by the main attribute evaluations only. We also assume that utilities are stochastic. Thus, we assume:

$$U_i = V_i + \varepsilon_i \tag{5.1}$$

where,

$$V_i = \Sigma_k \beta_k X_{ik} \tag{5.2}$$

where,

V_i = the structural utility of destination or choice alternative *i*;

β_k= the estimated part-worth utility for the *k*th ($k=1,2,...,K$) attribute level;

X_{ik}= attribute *k* of alternative *i*;

ε_i= an error term.

If one, in addition, assumes that individuals apply a utility-maximizing choice strategy, and that the measurement errors ε_i are independently and identically Gumbel distributed, the well-known multinomial logit model of the following form then predicts the choice probabilities of interest (cf. Ben-Akiva & Lerman, 1985; Oppewal & Timmermans, 1991):

$$p_i = \frac{\exp(V_i)}{\sum_{i'} \exp(V_{i'})} \tag{5.3}$$

The model can be extended to include both main effects and interaction effects, as follows:

$$V_i = \Sigma_{k \in K}\, \beta_k X_{ik} + \Sigma_{k \in K} \Sigma_{k' \in K}\, \gamma_{kk'} X_{ik} X_{ik'} \tag{5.4}$$

where,

$\gamma_{kk'}$ = the estimated part-worth utility for the interaction between attributes *k* and k' ($k \neq k'$).

This specification would depict any nonlinearities in the preference formation process.

5.5.4 Assumptions and validity

A number of assumptions needs to be made for conjoint choice modeling. A limitation of stated choice modeling relates to the authenticity of choices made under experimental conditions, i.e. whether responses to the choice experiment applied actually reflect future choice behavior. In order to test for internal validity, there are indicators of model fit available (cf. Ben-Akiva & Lerman, 1985) which test how adequate the model predicts the observations. However, these indicators do not measure the actual success of predictions. A test of external predictive validity would require revealed choices to validate stated choices. It involves the question whether people in reality will make the same choices as under experimental circumstances. That is, one first analyzes a plan in terms of the attribute levels varied in the experiment. The estimated conjoint model is then used to predict utilities and choices. Finally, these predictions are compared with revealed choices, ideally after the implementation of the plan. To date, the literature reports only few external validity tests. Many initiatives and measures had been *a priori* evaluated but were never taken into action, and can therefore not be tested externally. Nevertheless, the limited empirical evidence suggested that conjoint choice models perform equally well or better than models derived from revealed preference or choice data (cf. Louviere & Timmermans, 1990).

6 Integrating Choices and Constraints

6.1 Introduction

Both constraints and preferences play an essential role in the choice decision process. However, to date no attempts have been made to integrate both decision elements in a single choice model. Following Crawford & Godbey's (1987) model of encountering constraints hierarchically, we see that some constraints have their influence on the preference formation (see Figure 4.1). However, these constraints alone do not determine the preference structure. Timmermans' (1982) model indicates that other elements, too, play an important role in preference formation: individual taste, values and attitudes, background variables, the subjective perception of the individual (see Figure 4.2), and his/her combination rule. Likewise, the step from preference structure to the implementation of choice (participation in a leisure activity) is not entirely determined by interfering constraints. According to Timmermans, the individual decision maker applies certain decision rules to arrive at a final choice. Constraints may play an implicit role within this decision rule.

In an approach that integrates preference and constraints in a single choice model, we make the role of constraints explicit. The preference affecting constraints take a central position within the choice decision process. The fact that these constraints influence preference negatively, does not necessarily mean exclusion of participation. The negotiation and compensation of constraints and attributes take place within the subprocess of preference forming. In other words, it is here that the individual adapts his behavior to occurring constraints. In this study we refer to this constraint type as *circumstantial constraints*. Other constraints do exclude participation, and, instead of affecting preference, they affect choice directly. Here, we refer to these constraints as *blocking constraints*. Blocking constraints interfere between preference and choice. Their subsequent position in the choice decision process, between preference and choice, indicates that the process is interrupted by insurmountable obstacles. An alternative is preferred and would normally be chosen, but the constraint precludes participation.

A third type of constraint relates to knowledge and awareness of the individual decision maker. Godbey's (1985a) lack of awareness can be referred to as an *information constraint*. Information constraints limit the individual's knowledge of certain choice alternatives. Unknown choice alternatives will not be considered, let alone be preferred or chosen. This constraint type operates before alternatives and their attributes are considered at all. Hence, there is no direct effect on the negotiation and adaptation process.

Constraints alone cannot give an adequate explanation of behavior. Certain variables can have a positive effect on preference and thus choice, and operate as facilitators of participation. They can, however, also have a negative effect, and thus operate as constraints. In some cases, constraints exclude choice (*blocking constraints*), in others a process of negotiation and adaptation is set into motion (*circumstantial constraints*). We cannot know beforehand how a certain potentially constraining variable will operate, either as non-constraining, as inducing negotiation (circumstantial), or excluding choice (blocking).

For planning it is essential to know how this constraining influence works. Being involved in manipulation of the choice decision process, a planner or manager would want to know where interference is most convenient and thus planning can be most efficient. Planning interference, for instance, may be aimed at alleviating information constraints. This may be accomplished by promotion campaigns, in order to increase the public's knowledge of certain alternatives. Another objective of planning may be to influence the negotiation process: certain aspects (attributes) of the choice alternative may be changed in such a way as to alleviate these circumstantial constraints. It thus involves an indirect interference: in order to elimimate their influence, not the constraints as such are handled, but the attributes they are negotiated against. Thirdly, blocking constraints are those constraints to be dealt with directly. These constraints indicate that behavior cannot be manipulated other than by radical elimination of the constraint.

The review of theoretical concepts results in the conceptualization that is presented in this study. In this chapter, we present this conceptual model (see Figure 6.1), which integrates these notions of constraints in the choice decision process. As such, this model can be regarded as an extension of both Timmermans' (1982) and Crawford et al.'s (1991) conceptual frameworks. In essence, the model follows the decision process from personal background variables, through values, needs, motivations, to final choice behavior. This chapter further deals with a mathematical specification of the model as an extension of the simple MNL model. A model containing both the blocking and the circumstantial constraints is introduced.

6.2 Conceptual model

The interaction of the individual and the environment (cf. Iso-Ahola, 1980), in other words the confrontation of internal en external stimuli (cf. Um & Crompton, 1990), is the backbone of the conceptual model (Figure 6.1). This section discusses the lay-out of this model and the respective positions of all relevant elements within the choice decision process. Many variables have been distinguished to play a role in the choice decision process of participation in leisure activities. Personal background variables, such as personality, norms and values, experiences have an influence on the process. Other elements, such as benefits sought, the need for incongruity, optimal arousal (cf. Iso-Ahola, 1980), the need for diversity (cf. Dietvorst, 1993) and variety seeking (cf. Kemperman *et al.*, 1996) will be reflected in leisure behavior. Socioeconomic and financial aspects may facilitate or limit the available set of opportunites. Aspects of time, such as the availability of time to conduct leisure behavior or the time to travel over certain distances may play a role, and so do spatial aspects, such as the locations of homes and leisure destinations, and distances in between. Beside this position of the individual in the physical environment, his/her position in the social environment may have a direct and reflexive influence on motivations for leisure behavior. For example, the social role of being a parent influences leisure behavior, with the demands children impose upon daily life

A conceptual model aims at structuring the seemingly chaotic array of relevant aspects. The conceptual model makes theoretical distinctions among different elements within the choice decision process. Certain factors play an role before others do, some elements may have similar characteristics, and certain aspects only play a role through other aspects. In other words, the order of aspects is distinguished, the interaction between elements is conceptually determined and certain relationships are identified. In the conceptual model of this study the procedure of arriving at a choice decision is established. These choices are the outcome of a confrontation of internal and external stimuli. Leisure behavior, i.e., participation in leisure activities, is therefore the output variable of the conceptual model. The input is formed by the individual and his/her characteristics, and the features of the choice opportunities. Being the result of this process, behavior is not considered as the end. Any choice adds to personal experience and thus feeds back into the model as an input variable.

The conceptual model explains the individual's process of integrating information to arrive at a choice decision. Thereby, it integrates the conceptualizations of preference formation and choice by Timmermans (1982) (see Figure 4.1), and of constraints and participation by Crawford et al. (1991) (see Figure 4.2). In the integrated conceptual model, we demonstrate a process of preference formation within the choice decision process and a group of constraining elements. Before preference is formed and before the process is affected by constraints, certain dispositions drive the process into a certain direction. These factors are referred to as attitudes. Attitudes, together with values, needs, motivations and personal background, form the underlying origins of constraints and preferences. As this study is concerned with the operations of constraints and preferences and their mutual interactions, we will not elaborate upon these elements. In this study however it will merely serve as background information; we will suffice with a short explanation. The attitudes are to be found in the gray shaded upper part of Figure 6.1.

Constraints play an interfering role in this choice decision model, and are distinguished upon the stage in the choice decision process in which they operate. *Information constraints* are the first to operate; they affect the subjective perception of the choice alternatives. *Circumstantial constraints* interact with the attributes of the choice alternatives and their evaluation; *blocking constraints* interfere between preference and choice. From a consumers' point of view, while going through this decision process, the adaptability to constraints diminishes. Many information constraints are more or less voluntarily induced and can thus be traded off easily by considering known alternatives. The circumstantial constraints are possibly traded-off with the preference variables, but the blocking constraints have no prospect of adaptation.

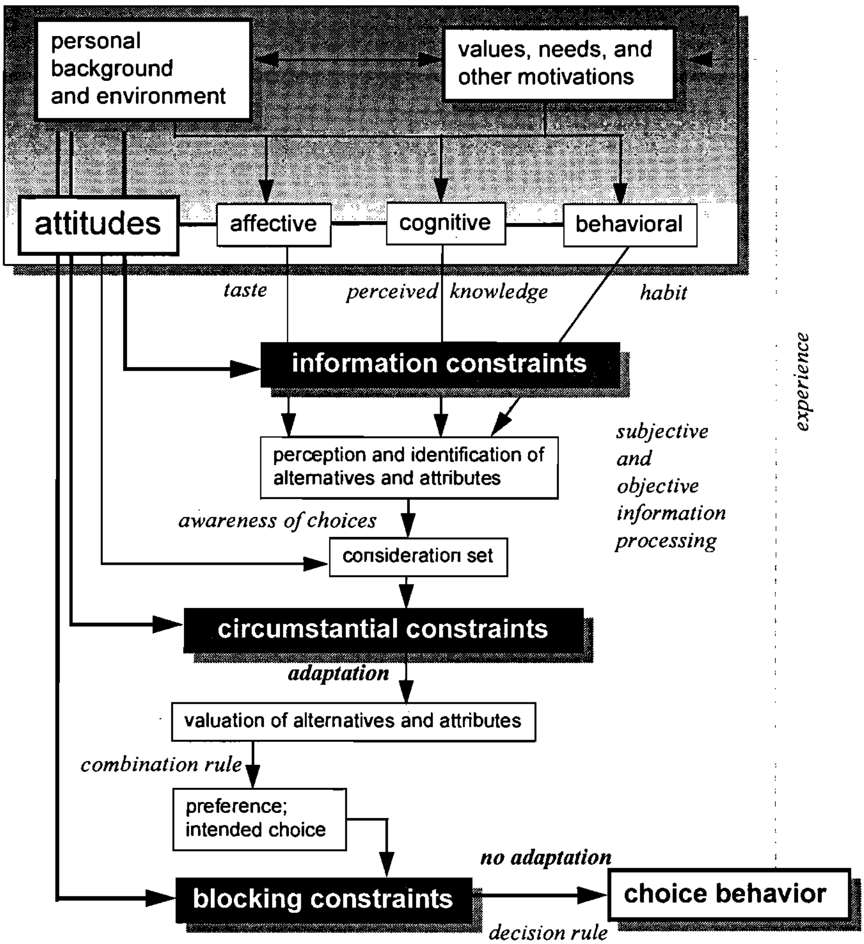
For planning and management, the ability to influence the operation of constraints and thus finally behavior increases with going through the process. In order to alleviate information constraints, communication with the potential consumer would need to be established. It requires costly information and promotion campaigns, with uncertain results. Circumstantial constraints may sometimes be easier to relieve, but again, results are uncertain. Because circumstantial constraints influence the sub-process of attribute valuation, removing the constraints may alter the judgments of alternatives. In contrast, the alleviation of blocking constraints, if they do exist, will have direct and predictable effects.

6.2.1 Attitudes

Individuals screen the information through attitudes. Attitudes (Fishbein, 1967; Fishbein & Ajzen, 1975; 1982) are defined as consistent reactions to external objects. There is an indirect relationship from attitude to behavior, through influence on other variables of the decision process. Through attitudes the external information stimuli (e.g., a set of leisure choice alternatives) are processed. Three attitude types are distinguished (Fishbein & Ajzen, 1982); the attitudes influence each other mutually. The affective attitude deals with emotional aspects and personal taste, causing subjective elements in the process. Through the cognitive attitude objective information is processed: it is the individual's consistent way of perceiving reality. The behavioral component is formed by the attitude to act according to the affective and cognitive attitudes. "Attitudes towards destination attributes are the difference between the magnitude of perceived facilitators and the magnitude of perceived inhibitors" (Um & Crompton, 1990: 437). So, according to the latter authors, attitudes determine the interaction of constraints and preferences.

The environmental attitudes (see section 4.2) that were studied by Jackson (1989) can be classified under the affective attitude. It is an individual and personal opinion that determines this attitude toward external objects. In turn, this affective attitude affects the cognitive and behavioral attitude towards leisure alternatives. For example, an environmentally conscious person will not consider jet-skiing as a serious activity, and would therefore never gather any information on jet-skiing opportunities (cognitive attitude). Moreover, this person will always screen any given leisure alternative upon its environmental attributes (cognitive attitude). In some instances such an environmentally conscious individual will even consider his/her usual and habitual leisure behavior upon its environmental aspects (behavioral attitude).

Figure 6.1 Conceptual model



6.2.2 Information constraints

Through information constraints, information is filtered. The awareness of the available set of choice opportunities, following the cognitive attitude, is limited by the fact that information is not always avaialable to the individual decisionmaker (cf. Godbey, 1985). Cause for information constraints can be found in the individual's personal background; factors such as lack of interest, lack of motivation, household characteristics, and non-availability of media can constrain the availability of information on choice opportunities. Moreover, attitudes can cause information constraints. Absence of information can be caused by, e.g., *(i)* only habitual behavior is conducted, there is no need for novelty (behavioral attitude); *(ii)* opportunities out of the taste dominion can be unknown (affective attitude); *(iii)* information has not been gathered at all (cognitive attitude). Thus, externally induced and internally caused information constraints can be distinguished. These constraints can be labeled financial, social, demographic, spatial, temporal, and the like. In this conceptual model constraints are distinguished upon the constraints' operating stage within the decision process. Information constraints appear in the earliest stage of the decision model.

6.2.3 Awareness and consideration set

After screening by the attitudes and filtering by the information constraints, the individual awareness set remains. It contains all choice alternatives and associated characteristics the consumer knows of. The information is usually incomplete and may be incorrect; the perception of the consumer has been subjectively filtered. A great number of the known alternatives will usually never be considered, and the set is further limited down to the consideration set. Attitudes, such as the affective and behavioral attitudes, play a role here. The behavioral component is formed by the attitude to act according to the affective and cognitive attitudes. This set contains all alternative options the consumer would possibly consider. Often repeated activities may cause the consumer not to process the information over and over as described, but to follow a habitual behavior. Thus, in case of extremely habitual behavior, new information is not let into the process. The attitude components jointly determine the individual's choice set: the set of alternatives with associated attributes that is available to be chosen from. This set is formed by an incomplete and subjective processing of information.

6.2.4 Circumstantial constraints

Within the resulted choice set the individual consumer will distinguish the different choice alternatives and the associated attributes. Before considering and weighing these, constraints have to be dealt with. Various types of constraints can be distinguished upon their contents. Time-space constraints are concerned with, for example, distance between the home address and the destination, or with the availability of spare time to travel or conduct leisure activities. Financial constraints state whether enough money is available for the trip. Social constraints have to do with needs and motivations of other people in the travel party. Operating as circumstantial constraints, they play an inhibiting role. These constraints interact with the alternatives and attributes. As such, the constraints make the alternatives more or less desirable. However, that does not necessarily preclude participation. In other words, the individual is engaged in a process of negotiation between the operating constraints on the one hand, and the alternatives and attributes on the other. For instance, a young couple may have trouble finding a baby sitter for their day off. With their preference for classical art museums that would normally make them to stay home. However, the *Archeon* archaeological museum offers all kinds of activities and performances for children. It enables the couple to adapt to the children-at-home constraint. Crucial here is that participation is not a priori excluded: these constraints imply the possibility to adapt to the given circumstances. Hence the name of circumstantial constraints.

6.2.5 Valuation of attributes and alternatives

In the process of considering the alternatives and attributes, choice alternatives are weighed according to their attributes (Timmermans, 1982). Part-worth utility values are assigned to the attributes. This consideration of alternatives and attributes can be influenced by circumstantial constraints: circumstantial constraints may affect the emotional value of certain choice alternatives, and thus have an influence on how taste is translated into the consideration process.

6.2.6 Preference structure

Through a combination rule (cf. Timmermans, 1982) the part-worth utility values of the attribute levels are combined into a preference structure, expressing the overall utilities of the given alternatives in the choice set. Simple mathematical examples of combination rules are the additive rule and the multiplicative rule.

The additive combination rule applies to a compensatory decision making process: low values on certain attributes can be compensated by high values on other attributes. On the other hand, the multiplicative rule express a noncompensatory process of alternative valuation. That is, a low value on a certain alternative induces rejection of the alternative: no compensation is possible. Individuals thus firmly demand certain attributes to be satisfactorily present in the alternative. It does not necessarily have anything to do with constraints: rejection-inducing attributes can relate to taste, for instance.

The preference structure lists the utility values of all considered alternatives; it is the first result of the choice decision process. Preference therefore directly indicates the individual's intention of choice. When no constraints occur any further, the alternative with the highest overall utility value will be chosen.

6.2.7 Blocking constraints

Normally, the alternative receiving the highest utility would be the most probable to be chosen. However, constraints may again disturb the decision process. Again, various types of constraints, such as time-space constraints, financial (availability of money for the trip) and social constraints (needs and motivations of other people in the travel party) play a role. This time however constraints operate in such a way that participation can be excluded: constraints have a direct influence on the decision whether to participate, and adaptation is impossible. For example, with limited financial resources and the entrance fee too high, bargaining can sometimes be insufficient to secure participation. These constraints can not be negotiated with other variables. The utility value of the alternative as such now has become irrelevant.

6.2.8 Choice behavior

The final outcome of the choice decision process is overt behavior. The model provides a feed back to early stages of the next decision problem. Disappointment, enjoyment and the fulfillment of needs and expectations is stored and will add to personal experience for the next choice occasion. Experience is not only derived from the latter choice, but also from the choice decision process, the adaptation decisions, and the information gained during the process. Needs and motivations may be affected by earlier choice decisions, for instance when variety is sought and it is unlikely that the same choice will be repeated. Experience may also change taste and habits, thereby affecting the personal attitudes. Moreover, the cognitive and behavioral attitudes may be affected, when the participation experience has opened new attributes to be considered for the next choice occasion. For example, a certain individual initially once chose to go to the *Efteling* amusement park for its picturesque fairy tale forest. However, once there, the roller coaster immediately caught his attention. The ride on the roller coaster was apparently so satisfactory that, from now on, amusement parks were screened on the availability of a roller coaster. While this person had never rode a roller coaster before, and had therefore never considered this attribute of amusement parks, for any next choice occasion the availability of a roller coaster had become a *conditio sine qua non*. In other words, the experience influenced motivation and the (affective, cognitive and behavioral) attitudes. In turn, the handling of information constraints will be affected, and so are the negotiation of circumstantial constraints and the evaluation of attributes to form a preference structure.

6.3 Theoretical concepts and model specification

In chapters 4 and 5, we reviewed conceptualizations of the leisure decision process and choice models. Some of this discussion concentrated on the role and impact of constraints. It was concluded that constraints have been identified in many different studies, but that conjoint choice models have failed to incorporate these constraints. Consequently, these models do not support planners in predicting activity non-participation or in providing them information abouts shifts in consumer utilities as a function of constraints. The goal of this chapter therefore is to develop a model that integrates choices and constraints. In this section, a constraints-based conjoint model will be developed.

The traditional conjoint model is based on the multinomial logit (MNL) model, stating that the probability of choosing a particular alternative is proportional to the utility of that alternative. The utility of the alternative results from the sum of the part-worth utility values of all the alternative's attribute levels (see equations 5.1 through 5.3). The MNL model thus assumes that constraints, being external influences, do not have any impact on individuals' preference functions and choice rules. Hence, preference functions and choice probabilities are assumed to be independent from any constraints. If one assumes, as in this study, that preferences and choices are dependent upon constraints, one needs a model that allows one to identify any shifts in choice probabilities as a function of the constraints involved.

The model will be developed to include both circumstantial and blocking constraints. Information constraints will, for practical reasons, not be modeled. A stated choice task (see chapter 5) requires to specify alternatives and the associated attribute levels. It is practically impossible to present respondents with unknown choice options. The identification of information constraints, however, is of crucial importance for mobility reduction planning. In chapter 7 we will further elaborate on the information and awareness elements.

In order to enable comparison and assessment of the relative importance of both the blocking and circumstantial constraint types, the choice model requires to include both theoretical concepts. Blocking constraints, that induce an immediate rejection to engage in the leisure activities, suggest a direct influence of constraints on the choice whether or not to participate. These (potentially) constraining factors determine participation, and whether the rest of the decision process, i.e. the consideration between choice alternatives and their attributes, is relevant at all. In other words, there is a direct influence of the blocking constraints on participation.

Only when these constraints are overcome and participation is thus secured, preference would come into play. The other type of constraints, the circumstantial constraints, affect the process in an indirect way. There is an influence on the consumer's preference structure. That implies interactions between (potential) constraints and the other elements of the decision process.

Constraints here are circumstances to be taken into consideration while choosing between alternatives. The decision whether to participate could depend on any variable or combination of variables in the choice set.

The model we specify incorporates both blocking and circumstantial constraints; information constraints are not modeled. Assume that a household is faced with some choice or consideration set A, consisting of I destinations. Assume that park i ($i \in A$) can be represented in terms of a set of K_i attributes X_{ik} ($k = 1,2,3...K_i$). These attributes describe the positioning of the choice alternatives on the K_i choice dimensions of interest. Moreover, assume that both blocking and circumstantial constraints impact individual choice behavior. Our problem then is to predict the probability that park i will be chosen out of A, given this set of attributes and blocking and circumstantial constraints affecting the choice behavior of interest.

6.3.1 No constraints model

Let us assume first that the constraints are not significant. That is, we assume that the choice behavior of interest is dictated by the attribute evaluations only. Let us assume that we wish to model the choice of three destinations (I = 3), each described by three attributes ($K_i = 3 \ \forall \ i$). Following random utility theory, assume that the utility U_i of alternative i consists of a structural part V_i plus some error term ε_i that depicts measurement error. If we assume that the preference or utility function is additive, the preference function can be expressed as:

$$V_i = \sum_k f_k(X_{ik}) \tag{6.1}$$

where,

$V_i =$ the structural utility of destination or choice alternative i;

$X_{ik} =$ the kth level of attribute X of choice alternative i.

Now, conjoint choice models typically assume that f_k is a part-worth function. That is, utility is not represented as some continuous function of X, but rather as a function of the attribute levels. One of the attribute levels or combination of attribute levels can be used as a base, and the utility/preference function can be estimated in terms of a series of indicator variables. That is, if we have N attribute levels, only N-1 indicator variables are required to fully estimate the model. Thus, the utility function can be expressed as:

$$V_i = \beta_{i0} + \sum_{k=1}^{K_i} \sum_{l=1}^{L_k - 1} \beta_{kl} X^*_{ikl} \quad (6.2)$$

where,

V_i = the structural utility of alternative i;

β_{i0} = the average preference/utility value of the choice alternative i;

X^*_{ikl} = the indicator variable for the lth level of the kth attribute X of alternative i;

β_{kl} = the parameter value for the indicator variable X^*_{kl}.

The meaning of the β_0- term depends on the coding of the indicator variable. The most commonly applied scheme is effect coding, in which case β_0 represents the average preference, and consequently β_{kl} represents the departure from average preference due to the corresponding attribute level.

In a conventional conjoint choice experiment, one of the alternatives would be chosen as the base alternative to set the scale of the preference function. Thus, assuming that the third alternative is chosen as the base, we would have V_1; V_2 and $V_0 = V_{base} = 0$. A similar principle as the one described above can be used to estimate alternative-specific preference functions. In this example, only two dummy variables are required. Thus, the full equation can be expressed as:

$$V_i = \beta_0 + \beta_1 + \beta_2 + \sum_{k=1}^{K_i} \sum_{l=1}^{L_k - 1} \beta_{kl} X^*_{ikl} \quad (6.3)$$

where,

V_i = the structural utility of alternative i;

β_0 = the preference/utility value of the base alternative (= 0);

$\beta_1 X_1$ = the alternative specific utility of alternative 1;

$\beta_2 X_2$ = the alternative specific utility of alternative 2;

β_{kl} = the parameter value for the indicator variable X^*_{ik} for the kth attribute of alternative i;

X^{*}_{ikl} = the indicator variable for the lth level of the kth attribute X of alternative i.

6.3.2 Blocking constraints model

Now let us assume that constraints do have an impact. Blocking constraints affect participation, and thus affect the utility of an alternative. They should be included to allow the probability of non-participation to shift as a result of the existence of these constraints. Now, we specify the mth constraint Y (m = 1,2,3...M) to be of blocking influence, with n levels (n = 1,2,3...N). Utility is a function of the attributes of the alternative and, moreover, of the constraints that occur with that specific alternative:

$$V_i = \sum_k f_k(X_{ik}) + \sum_m f_m(Y_{im}) \qquad (6.4)$$

where,

Y_{im} = the mth constraint Y occurring with choice alternative i.

Thus, the full equation can be expressed as an extension of equation 6.2:

$$V_i = \beta_{i0} + \sum_{k=1}^{K_i} \sum_{l=1}^{L_k - 1} \beta_{kl} X^{*}_{ikl} + \sum_{m=1}^{M_i} \sum_{n=1}^{N_m - 1} \gamma_{mn} Y^{*}_{imn} \qquad (6.5)$$

where,

Y^{*}_{imn} = the indicator variable for the nth level of the mth constraint Y occurring with alternative i;

γ_{mn} = the blocking effect of the nth level of the indicator variable for the mth constraint Y;

M_i = the number of constraints for alternative i;

N_m = the number of levels of the mth constraint.

One could assume that these blocking constraints can operate in interaction with each other. In other words, interactions occur between the various levels of the blocking constraints. In that case, utility can than be expressed as a function of the attributes of the alternative, of the constraints that occur with that specific alternative and, moreover, of interactions among those blocking constraints:

$$V_i = \sum_k f_k(X_{ik}) + \sum_m f_m(Y_{im}) + \sum_m \sum_{m'} f_g(Y_{im} * Y_{im'}) \qquad (6.6)$$
$$\forall m \neq m'$$

Thus, the full equation can be expressed as an extension of equation 6.5:

$$V_i = \beta_{i0} + \sum_{k=1}^{K_i} \sum_{l=1}^{L_k-1} \beta_{kl} X^*_{ikl} + \sum_{m=1}^{M_i} \sum_{n=1}^{N_m-1} \gamma_{nm} Y^*_{imn} \qquad (6.7)$$
$$+ \sum_{m=1}^{M_i} \sum_{m'=1}^{M_i} \sum_{n'=1}^{N_m-1} \delta_{mnm'n'} Y^*_{imn} Y^*_{im'n'}$$
$$\forall_{(m'>m)}$$

where,

$\delta_{mnm'n'}$ = the additional combined (interaction) blocking effect between the nth level of the mth constraint and the n'th level of the m'th constraint Y occurring with alternative i.

Thus, in order to measure the blocking influence, condition specific effects for each of the blocking conditions, and for all possible pairs of conditions (if one wishes to restrict the model to two-way interactions only) can be incorporated into the utility function. In the most general case, specific constraints may have an impact, but the model should also allow interactions (combinations) of blocking constraints to have an impact on the probability of (non-)participation.

6.3.3 Circumstantial constraints model

Circumstantial constraints can be incorporated in a similar way, although in this case, one needs to introduce interactions between circumstantial constraints and attributes because circumstantial constraints are assumed to influence the choice process by shifting the utility of the destinations. These interaction effects depict any departure from a single compensatory decision making process. Utility would thus be a function of an alternative's attributes and the interaction of the attributes with constraints:

$$V_i = \sum_k f_k(X_{ik}) + \sum_k \sum_m f_h(X_{ik} Y_{im}) \qquad (6.8)$$

A full specification of the model that incorporates circumstantial constraints is expressed in the following equation:

$$V_i = \beta_{i0} + \sum_{k=1}^{K_i} \sum_{l=1}^{L_k-1} \beta_{kl} X^*_{ikl} \tag{6.9}$$
$$+ \sum_{k=1}^{K_i} \sum_{l=1}^{L_k-1} \sum_{m=1}^{M_i} \sum_{n=1}^{N_m-1} \lambda_{klmn} X^*_{ikl} Y^*_{imn}$$

where,

λ_{klmn} = the circumstantial interaction effect between the nth level of the mth constraint and the lth level of the kth constraint.

6.3.4 Composite, all constraints model

Thus, the full model incorporating both blocking and circumstantial constraints can be represented as follows:

$$V_i = \beta_{i0} + \sum_{k=1}^{K_i} \sum_{l=1}^{L_k-1} \beta_{kl} X^*_{ikl}$$
$$+ \sum_{m=1}^{M_i} \sum_{n=1}^{N_m-1} \gamma_{mn} Y^*_{imn} \tag{6.10}$$
$$+ \sum_{m=1}^{M_i} \sum_{m'=1}^{M_i} \sum_{n=1}^{N_m-1} \delta_{mnm'n'} Y^*_{imn} Y^*_{im'n'}$$
$$+ \sum_{k=1}^{K_i} \sum_{l=1}^{L_k-1} \sum_{m=1}^{M_i} \sum_{n=1}^{N_m-1} \lambda_{klmn} X^*_{ikl} Y^*_{imn}$$
$$\forall m' > m$$

6.4 Operationalization

The problem of this study is made operational according to the above mentioned conceptual model. This operationalization involves empirical research, in which first the model's alternatives, attributes, attribute levels and constraints are specified. As compared with the conclusive planning procedure list of chapter 3, we focus on those steps that involve research on the direction and selection of planning actions. An outline of the choice decision problem is made by identifying the attributes and constraints that will be specified in the choice model. Relevant choice sets and attributes of choice alternatives (destinations, transport mode, trip characteristics) need to be selected. As some empirical studies on the subject have already been conducted (cf. Hanemaayer, 1988; Jansen-Verbeke & De Klein, 1989; Beke *et al.*, 1991); literature research may be useful. In addition, a qualitative and exploratory study featuring repertory grid technique is conducted. Hereby is the fact that people's subjectivity is important in perceiving opportunities and attributes taken into account. Another aspect that may be important is the role of constraints. Again, literature research may provide insight, but additional data collection is needed. For this purpose, decision plan nets are applied to identify potential constraints.

A large scale quantitative survey, featuring a conjoint choice experiment is applied to test the above specified models. Alternatives, attributes and (potential) constraints are systematically varied and presented to groups of respondents. The analysis involves estimating the above specified models and statistical tests whether these model specifications are valid. This includes all four models, the no constraints model, the blocking constraints model, the circumstantial constraints model and the composite, all constraints model. The blocking and circumstantial constraint types of the conceptual model are identified and tested for significance. Model tests and comparisons indicate which constraints are relevant for different groups of respondents.

The phase of investigating the potential market and analyzing consumer groups involves questions such as: who are the existing consumers for this particular destination, who are possible new consumers? Also, the exploration of consumers' background variables gives an indication of leisure constraints. Furthermore, their attitudes or preferences, and past behavior are analyzed. The market is segmented for different preference groups. Measures may have dissimilar impacts for different recreation destinations. Furthermore, distinguished types of destination may attract visitors with differing dispositions toward the planning interventions proposed. Chapter 8 discusses the use of a priori market segmentation for this problem. Different markets are distinguished for recreational day-trips, and thus different target groups are distinguished. The population is segmented on the basis of preferences expressed, indicating some attitude toward visiting certain types of parks.

The study of the feasibility of measures is carried out in chapter 10. This involves an investigation to whether plans can satisfy the objectives stated. The results of the choice experiment enable us to simulate choice under varying circumstances and planning measures. The results of the model estimations are used to describe some relevant choice simulations. A number of hypothetical acts of planning is analyzed on their impacts on choice behavior. Choice probabilities that are derived from the model estimation are interpreted as market shares for destinations and transport modes. Shifts in market share indicate whether plans can be predicted as successful. Finally, we can select the optimal combinations of interventions. The simulation chapter of this study will also give recommendations to communicate with the consumers through advertising and promotion campaigns.

7 Identifying Attributes and Constraints

7.1 Introduction

Before a conjoint choice experiment can be carried out, an outline of the choice decision problem is required. This involves the identification of all factors relevant to the choice decision process. In the conceptual model of the previous chapter it was indicated that choice alternatives and their attributes, and external conditions or potential constraints, form the elements that constitute this process. Notwithstanding the precise influence that these elements exert on the preference structure and final choice, initially their existence needs to be detected. Therefore, we first examine which choice alternatives and associated attributes individual consumers perceive. Secondly, we consider the conditions and circumstances that influence the choice decision process in a constraining way. The identification of the list of relevant alternatives, attributes, and constraints is a qualitative task; it does not matter in this stage to what extent these elements influence the choice decision process. The primary task is to distinguish the relevant factors.

First, the choice sets and attributes of choice alternatives (destinations, transport mode, trip characteristics) need to be selected. The usual way of identifying the relevant choice alternatives and their attributes is through literature research. It does depend however on the volume of knowledge that exists on the given subject matter whether literature can provide the required input. As some empirical studies on the subject have already been conducted (cf. Hanemaayer, 1988; Jansen-Verbeke & De Klein, 1989; Kingma & Jansen-Verbeke, 1989; Beke *et al.*, 1991; Van Keken *et al.*, 1995), literature research may be useful. However, because leisure mobility has only been studied since a few years, empirical results are rather limited. Furthermore, the studies that were conducted do not always provide the required relevant information on the elements of the choice decision process. A similar argument applies for the identification of constraints. Again, since the study of leisure mobility is relatively new, little is known about the constraints that influence this particular choice process.

An additional thorough qualitative identification of attributes and constraints is therefore required. Techniques to identify potential constraints have been discussed in chapter 5 and are used in the present chapter to explore the choice decision process for day-trips and transport modes, and thus identify relevant attributes and constraints. Pertinent questions guiding the analyses include: *(i)* what does an individual demand from a leisure trip, and *(ii)* what does the individual require from transport modes? To answer these questions, we conducted a detailed qualitative examination of all aspects that affect mode choice for leisure trips. Next, questions arise such as what makes an individual choose private over public transport, and how important the transport mode option would be related to other factors. Seeking more precise quantitative information, these questions go beyond qualitative identification only. In this chapter, we limit ourselves to the exploratory phase of the study.

The chapter is organized as follows. First, we briefly discuss the two exploratory methods that, in an adjusted fashion, are applied to analyze and depict recreation participants' choice behavior. The existing methods as such, repertory grid and decision plan nets, are inappropriate for the research questions of this study. Therefore, we adjusted procedures and questions associated with these methods. We discuss the problems and present solutions by introducing a scheme for the adjusted and integrated method. This is followed by the interpretation and discussion of results from a survey that features the adjusted methods. Results include a list of relevant attributes of choice alternatives, and factors that indicate constraints. The survey was held in July 1993 in Eindhoven and surroundings. The chapter concludes with a discussion of the applicability of the results for conjoint choice experimentation.

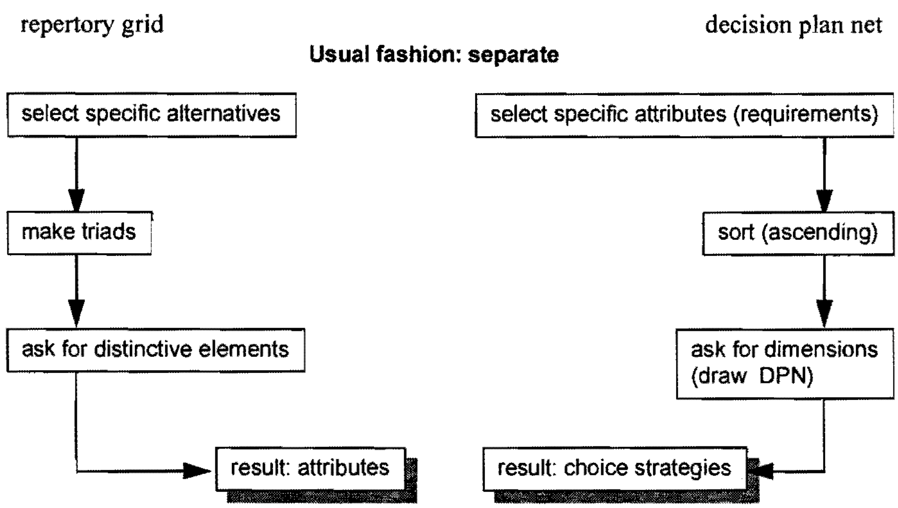
7.2 Applying the methods

As noted in previous chapters, we assume that leisure choices are the result of a cognitive decision process. The individual's perceptions of choice alternatives and individual constraints influence this process. An individual chooses from a set of alternatives, i.e. various attraction sites, and different modes of transport. He/she subjectively perceives a choice alternative by its (distinct) features and subsequently arrives at an overall preference judgment of the alternative by integrating the separate evaluations of these attributes. This process of integration is highly subjective. Furthermore, the weighing of choice process elements against each other is also highly subjective.

In order to identify these various aspects of the choice process, while accounting for this subjectivity, two methods can be applied. The usual procedures of applying these methods is shown in Figure 7.1. The *repertory grid* method (cf. Kelly, 1955; Hallsworth, 1988) may be used for the identification of attributes of choice alternatives. Alternatively, the *decision plan net* (DPN) method can be used (cf. Bettman, 1979; Park & Lutz, 1982) to identify the strategies that individuals apply in arriving at some choice. For the present study, we need to explore the consideration between elements in the choice process, i.e., among attributes, between constraints and attributes, and among blocking constraints. The decision plan net method can be applied to detect such strategies.

The repertory grid is a method to detect elements of the choice process with a minimum of researcher bias, while accounting for the subjectivity of this process (see chapter 5). Decision plan nets also have the advantage of minimizing disturbances caused by the interviewer or researcher. Applying these two methods to identify attributes and constraints of the leisure mobility choice problem requires one, however, to solve a number of crucial operational problems.

Figure 7.1 Usual procedure of the repertory grid and decision plan nets methods



The first of these is how to formulate individually perceived and contrasting features into independent variables that directly relate to the preference structure. Identifying independent and unequivocal attributes and constraints to provide an aggregate picture is often the main objective of the first step of any model building project. The results of the standard repertory grid studies do not readily meet this objective. Contrasting factors that distinguish choice alternatives are not necessarily similar to attributes that distinguish the alternatives' preferability. Moreover, not only positive elements of choice alternatives, but also explicitly negative attributes play an essential role in the choice decision process. This study proposes a solution to this problem, with an alternative formulation of the question that is posed to subjects to discriminate between choice alternatives.

The second operational problem relates to the random generation of triads. The alternatives are drawn randomly to generate triads. As was noted in chapter 5, certain alternatives, or combinations of alternatives, can therefore occur too frequently, and others not frequently enough. As a result, certain distinctive features of the alternatives may not be mentioned at all, and others too frequent. In any case, the triads will reflect the characteristics of the random-generation process; there is no underlying principle to generate the triads. Moreover, because the triads were generated randomly, respondents are not presented with identical questionnaires. Ideally, the researcher should have control over these factors, and establish a bias-free frequency of alternatives and combinations. Application of experimental design techniques enables such control. These techniques are common in conjoint modeling (see also chapter 5), where choice alternatives are constructed and varied based on their associated attributes. Advantages are *(i)* complete statistical independence, i.e., no correlations between any of the presented alternatives; *(ii)* frequency of occuring, of separate alternatives as well as combinations, can be kept under complete control; *(iii)* all respondents receive identical questionnaires.

While repertory grid provides a reliable procedure to identify choice attributes, there is no given procedure for the selection of the input variables of a decision plan net. For this third problem, the given solution is the integration of both methods. The attributes that result from the repertory grid procedure are used as the input to the decision nets.

The fourth operational problem relates to representation of the research method. It is crucial to the success of the method whether the results of the interview situation adequately reflect the respondent's real world considerations. For the choice of transport mode, people may be unaware of a real decision (Jansen-Verbeke & De Klein, 1989: ii). While concentrating on the attributes differentiating the destinations, respondents may forget to mention characteristics relating to transport. Especially negative perceptions of public transport that might become important under different circumstances, may be neglected. In the presented integrated method this problem is solved by separating public transport and car in two different tasks, thus forcing respondents to consider the relevant attributes. In the first task the travel destinations to be considered can be reached by public transport only, in the other the by car only.

Because we only aim at qualitatively exploring the choice decision process, a number of these problems is not essential. The importance of the identified choice elements will be quantified in a later stage of the study. The conjoint model will test for the relevancy of these attributes. Nevertheless, the methods provide a solid base to identify attributes (mainly through repertory grid), as well as constraints and tradeoff strategies to choice behavior (mainly through decision plan nets). In het next section, we present a procedure that integrates both methods, and show how the operational problems have been solved. The questionnaire, which aimed at exploring choices attributes, dimensions, and strategies, was adjusted to overcome the above mentioned problems.

7.3 Data

7.3.1 Sample

In the summer of 1993, a spatially stratified sample of 150 subjects in the region of Eindhoven and Tilburg (the Netherlands) were interviewed using a combined repertory grid and decision plan net procedure. Respondents were selected from a random telephone survey involving a total of 720 calls (see Table 7.1). 525 persons agreed to undergo a 5 minute telephone questionnaire, that also aimed at filtering people who do not participate in outdoor recreational activities from the sample. Outdoor recreation participants were defined as persons having made a recreational day trip that lasted at least two hours in the past two months. This encompassed the period from Easter through to Pentecost, normally the peak season for theme park, beach and zoo visits. This telephone selection resulted in 324 outdoor recreation participants, 174 of whom were not willing to proceed to the full 50 minute (average) face to face interview. This interview was conducted at the respondent's home. Data on household composition, age of household members, and car ownership were collected for all telephone respondents.

Stratification of the sample was such that different types of home environments were included in the study: 40 percent of the respondents live in urban areas (the cities of Tilburg and Eindhoven), another 40 percent in suburban towns (the towns of Oisterwijk and Nuenen), and 20 percent in rural villages (in the Kempen region). The non-recreation participants and the people not willing to join the face-to-face interview were taken as control groups. We detected no significant differences on the collected background variables at the 0.05 level between the group of 150 respondents and these two control groups, nor between the two control groups. Hence, we have no reason to believe the sample is biased.

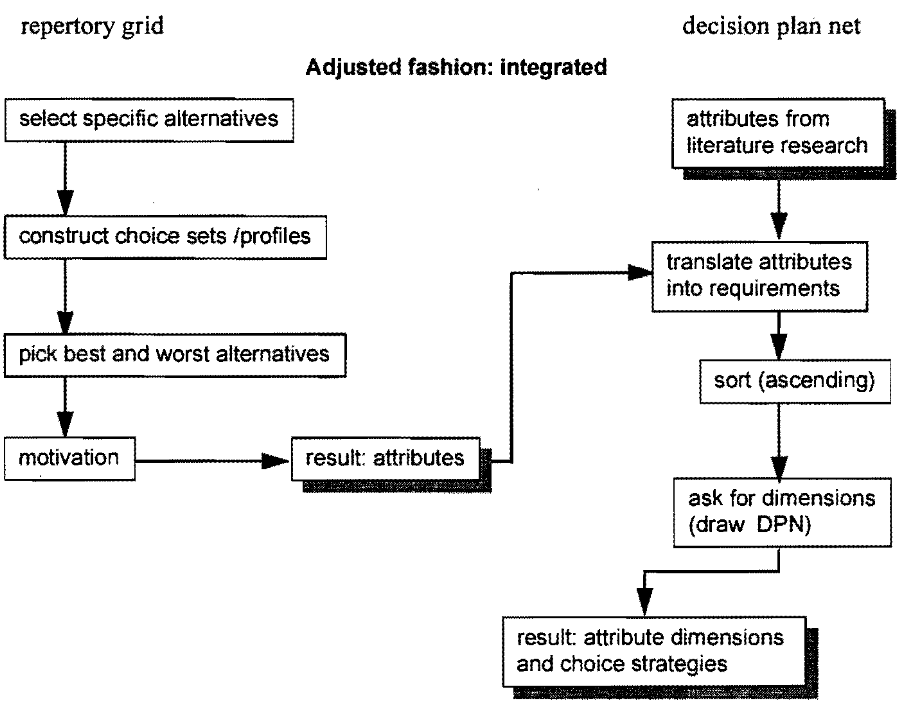
Table 7.1 Selection of respondents and response rate

	Rate	N
Approached in random phone survey		720
Refused to join questionnaire	27%	195
Agreed to phone questionnaire	73%	**525**
Have not made any leisure trip during past two months	38%	201
Fulfill requirements of recreation participation	62%	**324**
Refused to home interview, or could not make appointment	54%	174
Actual response	46%	**150**

7.3.2 Adjusted questionnaire

To elicit a valid list of attributes, it is vital to have the respondent consider a diverse set of alternatives. In order to set up a repertory grid study, first, a list of choice alternatives must be selected. The alternatives should be relevant attraction destinations to the respondents concerned. The second step concerns the procedure of presenting these destinations. In a normal repertory grid procedure, triads of alternatives are presented to the respondents. They are then requested to identify which attributes distinguish the three alternatives. There is no given procedure how to construct the series of triads. Instead of the randomized triads, we applied an experimental design method to construct sets of destinations. Thirdly, the formulation of the question is important. We adjusted the response question in such a fashion that, instead of just distinguishing contrasting elements, the respondents were invited to distinguish distinctive preference factors. Systematically varied sets of choice options were presented to the respondents. They were requested to pick the most as well as the least attractive alternative, and then asked to express their motivations for the best and worst choices. Thus, explicitly positive as well as explicitly negative elements were considered.

Figure 7.2 Adjusted, integrated procedure of the repertory grid and decision plan nets methods



The decision plan net procedure starts with a selection of the relevant attributes. Here, this was done by means of the repertory grid process. So, we applied both models in an adjusted and integrated fashion. Figure 7.2 (cf. Figure 7.1) demonstrates this new procedure, and how the methods were adjusted and used in an integrated fashion. Instead of using both methods separately, we applied an integration of the two. The integration of both methods was accomplished by using the output of the adjusted repertory grid task as the input for the decision plan net. Moreover, literature research was used as an additional input to the decision plans.

A limited number of typical recreation sites (see Table 7.2) was selected to present to the respondents. The list comprises the four most important categories of large scale day-trip destinations: zoos, amusement parks, museums, and beach sites. Each category featured four destinations, all within a distance range of 150 kilometers (some 100 miles) from the respondents' homes. It must be noted that these destinations are primarily relevant to the sample: the selection is therefore geographically biased. The attraction sites were presumed to be well known to the public. We selected the sites such that urban destinations (such as *Artis* and *Antwerp zoo*, *Railway museum* and *Rijksmuseum*) as well as non-urban (such as *Efteling*, *Walibi*) were represented.

Table 7.2 Typical recreation destinations for the sample region

zoos		**family amusement parks**	
Antwerp Zoo	urban	Efteling, near Tilburg	non-urban
Burgers' Arnhem	non-urban	Walibi /B, near Brussels	non-urban
Artis Amsterdam	urban	Madurodam, The Hague	urban
Beekse Bergen, near Tilburg	non-urban	Land van Ooit, near Tilburg	non-urban
museums		**beach sites**	
Rijksmuseum Amsterdam	urban	Hoek van Holland	urban
Open air museum Arnhem	non-urban	Scheveningen	urban
Railway museum, Utrecht	urban	Domburg	non-urban
Kröller-Müller, National Park De Hoge Veluwe	non-urban	Renesse/Haamstede	non-urban

A vast number of destination combinations can be made and presented to a respondent. The experimental design controls the selection of relevant combinations of alternatives. A fractional factorial design (see chapter 5) enables one to reduce the size of the design, with a comparative strength similar to a full factorial design, but with considerably less treatments. We placed the attraction destinations in a 5^4 fractional factorial design, with 4 attraction types: museum, amusement park, zoo and beach, each with 4 specific destinations. Each specific repertory grid treatment here is a profile of attraction types with a variation of different specific destinations. The fifth attribute level denotes the non-availability of a destination in the set. The 5^4 fractional factorial design involved 25 sets. So, we did not work with triads of alternatives, but with profiles of consisting of two, three or four destinations. The whole task was carried out twice: once for public transport trips, and one for car trips. In total, the task therefore comprised 50 sets. To avoid respondent fatigue, we blocked the design into varying sets of 5 destinations, and presented each respondent with 15 treatments for the public transport task, and 15 for the car task. Fifteen of these sets were described as a trip to be made by car, the fifteen others represented a trip by public transport (bus or train).

The respondent was requested to identify the most as well as the least preferred day-trip in each choice set, and to motivate these choices by naming the characteristics that induced these responses. Thus, they identified not just elements to contrast between the alternatives, but rather the elements that distinguish their attractiveness or non-attractiveness. In this way, as compared with the usual repertory grid question, the task is a closer reflection of a real world situation. Furthermore, we believe this particular task will result in attributes that therefore better represent the individuals' elements of the preference structure. A preference structure comprises, besides a list of positive elements, also a collection of explicitly negative aspects of the choice alternatives. With the respondent's consideration of these negative elements, by picking the least preferred day-trip, these are also identified.

In this study the list of attributes that was obtained from the repertory grid exercises (car and public transport tasks) was put into two respective and separate decision plan nets. The attributes were presented as a list of conditions to be fulfilled in order to choose a site. Unfavorable and negative features (e.g., *'I don't* *like museums', 'it is too far away', 'boring')* were inverted and thus presented as a respondent's requirement for a day-trip (*'it is not a museum', 'it is not far away', 'it is not boring'*). The question posed to the respondent now was, what he/she would do if the criteria could not be satisfied. So, the DPN task added strategies (dimensions) to the collected attributes. Hence, the repertory grid method and the decision plan net method were combined into a single task that allowed us to identify different constraints that operate in the process of preference and choice decision formation.

Table 7.3 Attributes used in all decision plan nets

public transport	car
cost, max. ________	cost, max. ________
travel time	travel time
number of changes (bus/train etc.)	guarded parking
attractive for children	attractive for children
attractive route	attractive route
combined train and entrance ticket	parking space nearby

Two short lists of supposedly important attributes for either public transport and car trips (see Table 7.3) were developed. Literature research provided these variables (Jansen-Verbeke & De Klein, 1989; Kingma & Jansen-Verbeke, 1989; Beke *et al.*, 1991). Cost and travel time are among the most obvious and also frequently mentioned attributes of day-trips. Children may cause an important constraint, to choosing particular alternative destinations, as well as to choosing specific transport modes. Transfers in public transport may influence this mode's attractiveness, as do parking attributes for a car trip. An attractive and scenic route may enhance both public transport and car trips. The combined train and entrance ticket was inspired by the initiatives of the mobility plans (see chapter 3). The selected attributes were used in all individual decision plan nets, regardless the outcomes of the repertory grid task. This was done to overcome the possible problem of respondents not mentioning a sufficient amount of attributes in the adjusted repertory grid task. For the attributes cost, travel time and number of changes the respondent was asked to specify the maximum acceptable level.

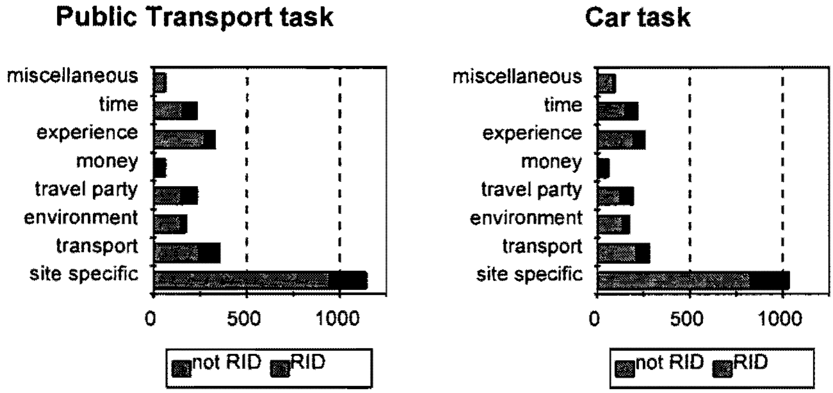
7.4 Analysis

7.4.1 Attributes and rejection inducing dimensions

The adjusted repertory grid task resulted in a total of 791 different attributes of the leisure trips by public transport, as mentioned by the 150 respondents. For car trips the total number was 717 (see Figure 7.3). For the public transport trips, positive aspects were called 1083 times, and negative aspects 900 times. These are respectively 1021 and 787 for car trips (see Figure 7.3). The most frequently mentioned characteristics were specifically related to the chosen site. These include a wide range of different aspects of personal preference regarding the presented destinations as a whole and particular aspects of sites, such as *'I like zoos'* (as a motivation to choose a zoo as the best alternative), *'The site is dirty'* (as a motivation to choose a certain beach site as the worst option), and *'I don't like modern art'* (expressing an aversion to the museum Kröller-Müller). Moreover, the site specific attributes were, for the total sample, preeminent regardless they were mentioned to accept an alternative or not. For public transport trips, 45 percent of all features with a rejection inducing dimension (RID; see chapter 5) were of this category; for car trips 40 percent of all RID's were site specific.

Frequently mentioned examples of these decisive attributes are shown in Table 7.5. Financial aspects (money category) were scarcely mentioned in the repertory grid task, but appeared to play an important role for a number of people. On the other hand, features of the site's environment were frequently reported, but not many were decisive (see Figure 7.3): only a small portion of all mentioned environment attributes is reported as RID.

Figure 7.3 Frequency of mentioning attributes, categorized, rejection inducing dimensions and other dimensions



On the whole, more rejection inducing dimensions were reported for public transport trips than for car trips (see Tables 7.4 and 7.5). This shows that people have more conditions to be fulfilled for public transport trips than for car trips. More positive and more negative attributes were mentioned for the public transport trips. The largest difference occurs between the number of RID's for the categories of public transport quality and the category of car transport quality: 98 against 59 (see also Figure 7.3). Also noteworthy is the difference in RID frequency for the time/time budget category.

Table 7.4 Mean number of attributes and rejection inducing dimensions

	public transport task	car task
N different attributes	5.3	4.8
N positive attributes	7.2	6.8
N negative attributes	6.0	5.2
Rejection Inducing Dimensions	3.5	3.2

Taste and personal aspirations play the most important role in choosing leisure destinations. These variables express the individuals' taste differences, and primarily determine which attraction type will be chosen. It is unlikely that any mobility plan would affects these underlying attitudes (see chapters 4 and 6). However, they may give a strong basis to segmentation of the population. The next chapter will elaborate on this further.

For the outline and direction of leisure mobility planning, the other attribute categories are in fact more essential. These are the variables that are likely to be affected by planning measures, and where opportunities for manipulation exist. As Figure 7.3 shows, for a large number of respondents, the quality of (public and private) transport facilities, travel party (mainly children), experience (knowledge), cost and time budget attributes also emerged as important and decisive variables.

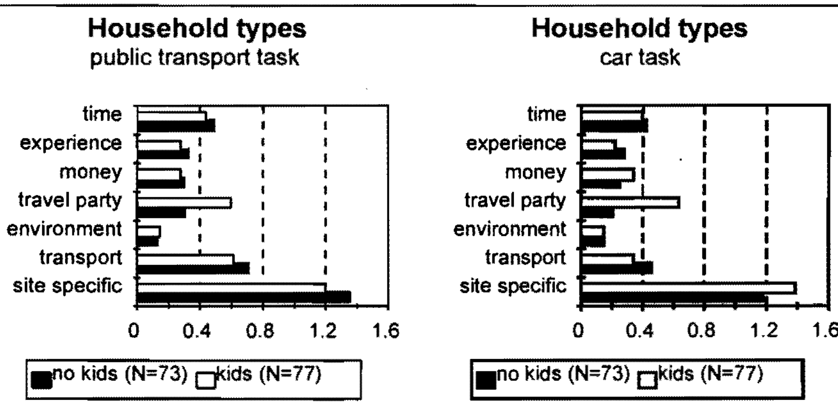
Table 7.5 Frequently mentioned rejection inducing dimensions

category	feature	public transport task	car task
Site specific	interesting	27	32
	nice, pleasant	23	24
	no museum	15	13
	no amusement park	9	11
	no beach site	12	10
	quiet, not crowded	13	11
Public transport quality	accessible	19	
	attractive route	10	
	combined ticket	11	
	change transport	34	
Car transport quality	parking space nearby		15
Travel party	attractive for children	39	37
Money	cost	40	40
Experience	good experience	16	12
Time/time budget	travel time	48	47

7.4.2 Rejection inducing dimensions for different groups

For the communication of mobility plans it may be useful to examine whether the specifications of constraints differ for some background variables. Additional data on household composition, age, socioeconomic status, time budget, and recreational patterns were collected in the survey. We made distinctions between families with children under 12 and households without children. Respondents were also classified into three income levels. Past recreational travel behavior was characterized by the number of visits to the 16 selected sites in the past two years (three ordered categories) and experience with public transport for these trips (a dichotomous variable).

Figure 7.4 Mean frequency of rejection inducing dimensions for household types



Differences in RID frequency scores were detected for the two groups distinguished in terms of household composition (see Figure 7.4). We distinguished a group with no kids under 12 in the household (N=73), and a group with kids (N=77). The diagram clearly shows that the presence of young children involves more constraints of travel party (mainly children). However, only 45 RID's were counted for this group of 73, which means that there is still a large (sub)group with children who do not report to be severely constrained. Moreover, on any other category of RID's the group with children are not different from the group without children.

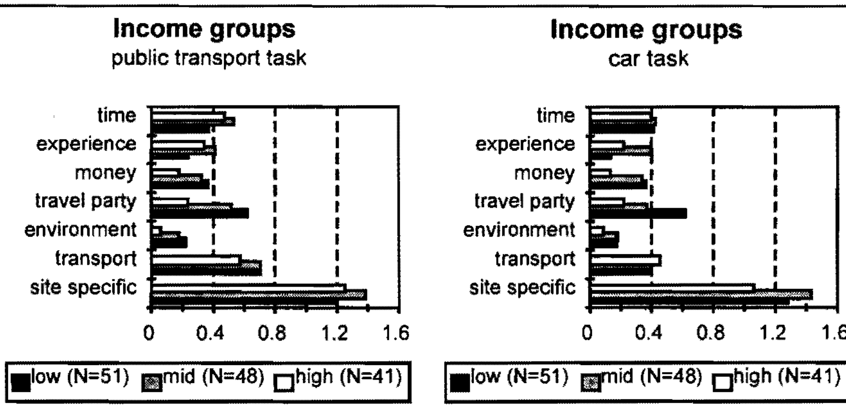
Even on the financial aspects of the recreational trip there are no substantial differences in the frequency of RID's, although the childless group is willing to spend less (see Table 7.6). The group with children can be divided into two subgroups: those who are constrained by the presence of the children and those who are not. The latter may adapt to the circumstances: if a destination is highly preferred but not suitable for their children the destination is not rejected. They may look for solutions such as baby-sitting.

Table 7.6 Mean levels of maximum values, rejection inducing dimensions

	children in household		made recreational trip by public transport past 2 years	
	No (N=73)	Yes (N=77)	No (N=109)	Yes (N=41)
Public transport task				
changes	1.9	2.4 1)	2.1	2.3
cost Dfl.	157	252 1)	219	177
travel time	2:29	2:14	2:13	2:52 1)
Car task				
cost NLG	163	253 1)	215	167
travel time	2:40	2:32	2:32	2:46

1) Difference significant at alpha < .05

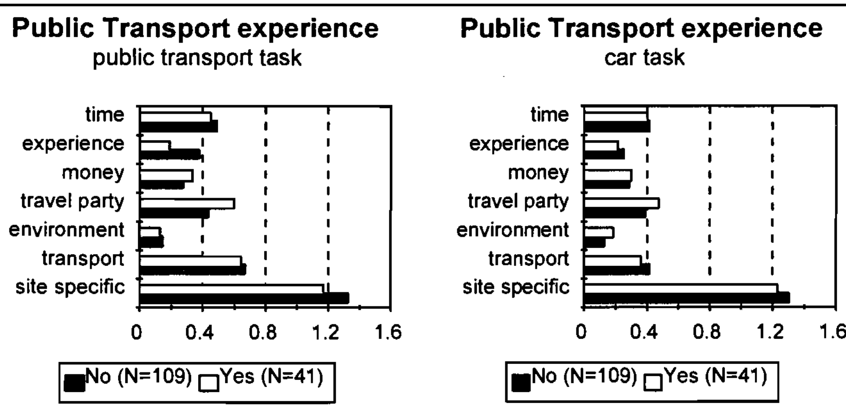
Figure 7.5 Mean frequency of rejection inducing dimensions for income groups



Differences between groups become clear when respondents are classified by income level per capita (see Figure 7.5). As expected, the rich group showed the smallest number of RID's. The low frequency of RID's of the travel party (children) category for the highest income group is caused by the fact that 38 from the 41 high income respondents have no children. Again, only small subgroups reported rejection of actually too expensive trips: initially mentioned maximum values appeared to be flexible.

The group of people with recent experience in making recreational trips by public transport is relatively small (N=41) compared to the group with no recent experience (N=109). Figure 7.6 shows that differences between these two groups on RID scores for both tasks are relatively small. However, Table 7.6 demonstrates that, for the public transport task, there is a significant difference on the maximum tolerable time to travel. The group with experience tolerates 40 minutes more than the group without. People with experience of recreational transit allow more or less the same travel time for car and transit, while the non-experienced demand transit to be 20 minutes faster than the car.

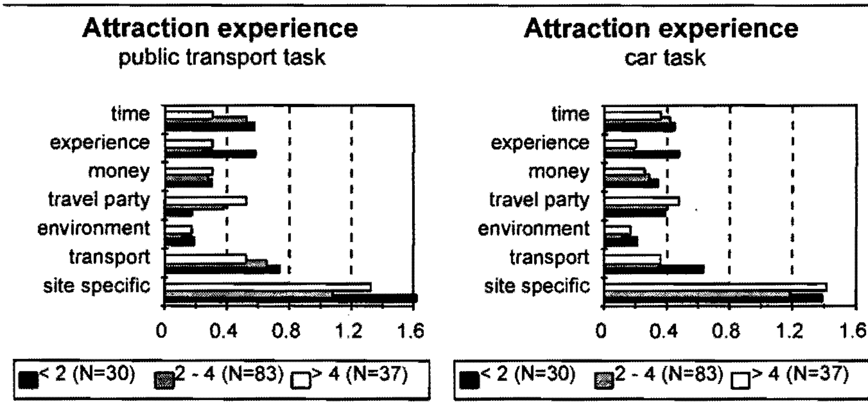
Figure 7.6 Mean frequency of rejection inducing dimensions for public transport experience[1]



1) *did you make a leisure trip by public transport in the past two years?*

The group of very frequent visitors to the selected sites showed a high number of RID's on the site specific attributes (see Figure 7.7). Obviously, these people are more aware of the specific aspects of the sites and, consequently, mention more essential conditions to accept or reject the site. As far as the aspect of experience is concerned, the less dynamic recreation participants mentioned relatively more RID's than the other two groups (Figure 7.7).

Figure 7.7 Mean frequency of rejection inducing dimensions for attraction experience[1)]



1) Number of trips to the selected destinations over the past two years

7.5 Discussion

For some people, constraints play an important role in their choice process. The presence of children in the household does constrain a group of families, but an almost equally large subgroup seems to be able to adapt to these circumstances. Money seems to have a similar impact: for some people lack of money hinders participation, others adjust to the situation.

Constraints originating from personal background variables do not seem to influence the evaluation of transport modes. For all classifications of respondents in the survey, more rejections are reported for public transport trips than for car trips, but no differences occur between the classified groups. The attributes that show the largest difference, are those related to the quality of the specific transport mode. The higher overall numbers of rejection inducing dimensions for public transport alternatives illustrate that people are likely to reject a trip by public transport sooner than a car trip.

The rejection inducing dimensions explored indicate constraints that influence the process of attraction site and transport mode choice. However, the results of group specific results demonstrate that background variables may possibly cause constraints, but certainly not determine constraints. Constraints may operate in different ways: for some people constraints operated as blocking, for others adaptation was possible. We refer to the latter as circumstantial constraints.

In general, the respondents demand more conditions to be fulfilled from a public transport trip than from a car trip. It suggests that leisure trips by car will always be more attractive than trips by public transport. Among the attributes, the most frequently mentioned are site specific. The fact that, while considering choices, individuals mention these so often, and moreover, report these most repeatedly as rejection inducing dimensions, suggests that individual taste related variables play a far more important role than any other attribute category. It is in these attributes that differences between specific destinations and attraction types are expressed. However, for leisure mobility plans these variables are only relevant in relation to the transport variables. Tourists, when confronted with mobility measures, have already chosen for a certain destination type. Interesting is whether policy measures will make these tourists *(i)* to quit their behavior, *(ii)* to choose something else, or *(iii)* to adjust their demands by trading off site specific variables and transport related attributes. That is, measures could either cause non-participation (not the intention of measures), a change of destination (another effect unintended), adjust their preference values and drive anyway (again, not the intended effect), or change the prospected transport mode and take the train (the intended effect).

However, it must be noted that the results of this part of the study only describe individuals' perceptions of choice alternatives under different circumstances, not potential real behavior. The respondents did not express their preferences on a range of different alternatives, nor were they invited to simulate choices between the alternatives. For example, from a choice experiment or a preference task, conclusions about likely effects of stimulating and discouraging measures can be drawn. In order to quantify the process of adaptation to constraints, and to gain insight in the interaction with preference variables, an analysis of such choices is required.

8 Segmentation of the Day Trip Market

8.1 Introduction

One of the central issues in leisure planning and marketing concerns the identification of target groups. Effective segmentation schemes are considered to be of utmost importance for successfully marketing tourism products or implementing leisure-related policies. In methodological terms, segmentation research has typically followed either of the following two approaches. Market segments can be derived by clustering respondents on the basis of their socio-economic characteristics or overt behavior. Alternatively, segmentation can be based on individuals' preferences for various products. The latter approach usually involves various steps. First, the attributes influencing tourism-related decisions are elicited. For instance, a repertory grid procedure can be applied to identify these influential attributes. Once these attributes have been identified, some preference or choice model is used to describe individuals' preference functions. Especially, conjoint and compositional preference models have found ample application in tourism research. The estimated preference functions are then used to identify groups of individuals which are homogeneous in terms of their underlying preference functions.

In this chapter, we further elaborate on the integrated series of tasks of the previous chapter and use the data set described in this chapter. On the basis of preference judgments of a list of particular choice alternatives (attraction destinations), a segmentation of leisure consumers is made. After introducing the procedure used to identify the segments, the results of the analyses are reported. The segments are described in terms of their constraints on leisure behavior. Finally, possible marketing strategies for each of the identified market segments are discussed, with particular reference to constraints on behavior.

8.2 An integrated approach

In the previous chapter, we measured the attributes and constraints influencing respondents' leisure travel decisions and identified the role these factors play in the decision making process. In order to use these results to identify consumer segments, a preference function should be derived which allows us to position leisure destinations on a preference scale. To this end, we used the data described in the previous chapter, and applied a new model that containted choice-based scaling. Results were obtained simultaneously as part of an integrated measurement approach, using the following procedure.

First, the potential destinations were classified into types. For each type, *N* destinations were selected. Real-world destinations were directly used for this purpose. Next, the destinations were placed into choice sets, using the principles of the statistical design of experiments. Because we identified four sites for each destination type, and each type can either be absent or present, all combinations of destination types involves a 5^4 full factorial design. Two orthogonal fractions of this design, involving 25 sets were constructed, one for trips by public transport, and one for leisure trips by car. Thus, choice sets varied in size and composition. The maximum size involves one destination for each of the four types of leisure destinations. Choice sets can be smaller if one or more of the destination types are not available. To avoid fatigue, respondents were asked to respond to only 15 choice sets, which were drawn at random. Respondents were requested to identify the most as well as the least preferred destination in each set of alternatives, and to name attributes that generated this response. This resulted in a list of attributes the respondents used to discriminate between the destinations.

The attribute elicitation task generated choice frequencies for the destinations included in the choice sets. These frequencies were aggregated across respondents in order to serve as the input of a scaling model that allows one to position the destinations on a preference scale. Because orthogonal designs were used, the experimental design fulfills the sufficient and necessary conditions to estimate a multinomial logit model. Hence, a MNL model was used to derive the preference scale.

The preference function describes the positioning of the destinations on an overall preference scale, but does not take constraints into account. Rather than focusing on this function, the choice frequencies observed across the designed choice sets were used as input for a clustering algorithm to group the respondents into segments according to their choice patterns as observed under experimental conditions. Any clustering algorithm or other appropriate grouping technique may be used to derive the segments.

8.2.1 Segmentation procedure

The potential destinations are described in the previous chapter, and listed in Table 7.1. The alternatives were presented to respondents not as destinations, but as comprehensive leisure trips, including transport mode, journey both ways and a few hours stay at the destination. To force respondents to explicitly consider attributes of the transport mode, we invited them to perform the same choice/attribute identification task twice. The first series of choice sets represented trips to be made by public transport, the second series was similar and represented trips to be made by car. Consequently, respondents had to take public transport attributes into consideration, e.g., complexity and length of trip, and accessibility, in combination with the site's specific features. Likewise, in the second series of choice sets, car trip attributes, such as parking facilities, the probability of traffic jams, and the site's specific features were jointly considered.

The pattern of choices across the choice sets served as input for a hierarchical clustering algorithm to group the respondents into segments. In general, if an orthogonal fractional factorial design is used and all respondents express their choices for the same choice sets, the responses to all choice sets can be used directly as input for the clustering routine. In some applications, such as this one, the number of choice sets may be too large, and consequently, the reliability of the responses may be at risk. To avoid fatigue and patternized response patterns, one can construct a fraction of the factorial. If one is willing to assume that choice probabilities are independent from the existence of any other alternative in the choice set, then the choice frequencies for each destination, counted per respondent, can still be used as input for the clustering algorithm. If, as in our case, a randomization procedure has been used to select the choice sets that are presented to respondents, one no longer has strict control over the number of times a particular destination is presented to respondents. The proportion of times a destination is chosen, given the number of times it has been presented, is a more reliable measure to perform the segmentation. This option was chosen in the present study. Because respondents were requested to make choices for each of the 16 leisure sites when travelling by public transport and when travelling by car separately, their adjusted response patterns to 32 profiles were used as input for the cluster analysis. The *average linking within groups* method was used to group the respondents. This method groups respondents such that the average Euclidean distance between all members of the resulting cluster is as small as possible.

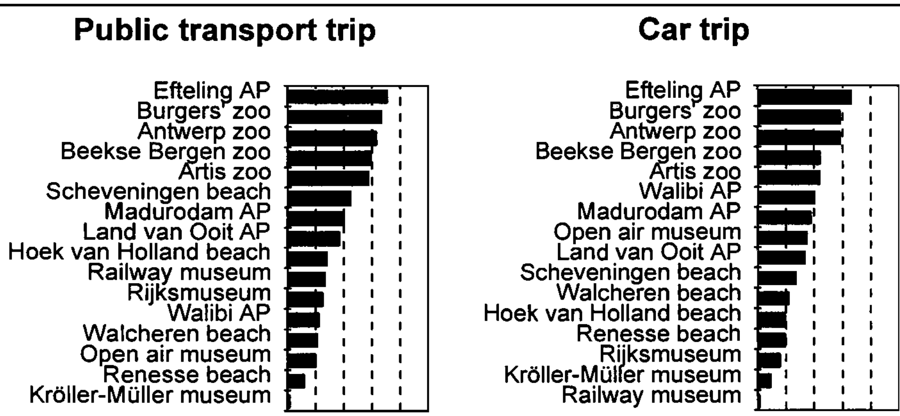
Four segments resulted from this procedure. First, we describe each segments in terms of the personal characteristics of their members, and their average use of the destinations types. For each segment separately, a multinomial logit choice model was also estimated, which positioned each of the leisure sites on a preference scale. This analysis was conducted twice, once for the public transport scenario and once for the car scenario. The aggregated choice frequencies were used as the dependent variable of the choice model, the leisure sites were represented by a set of dummy variables. In each preference model, *Walibi* was coded as zero. Iterative reweighted least squares analysis was used to estimate the the preference scales. For Figures 8.1 through 8.4 we re-scaled the preferences, and assigned the value zero to the destination with the lowest preference.

Within the sample of 150 respondents (see Table 7.1, previous chapter), we distinguished 4 clusters with a clear preference pattern. The results of these analyses are presented below in Figures 8.1 through 8.4 (see also Appendix B.1 through B.4).

8.2.2 Segment #1: Efteling and the zoos

40 subjects were assigned to this group. Members of this segment are primarily attracted to zoos and the amusement park *De Efteling*, and have recently made relatively many trips to these sites. The group's preference for museums is low; the low museums patronage (an average 0.23 visits in two years time) gives evidence to that.

Figure 8.1 Preference results for segment #1 (Efteling and zoos)

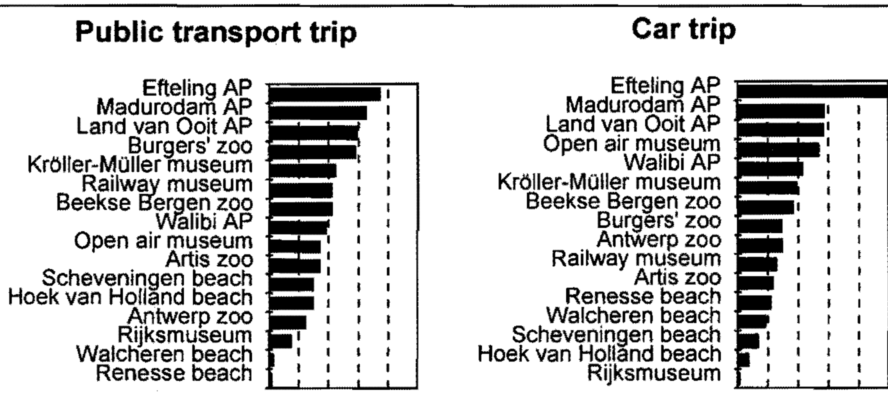


Despite the highest preference for *De Efteling*, the zoos are more popular than the other amusement parks. Beaches are not particularly popular, but the revealed choice data (destinations visited over the past two years; see Chapter 7) show that nevertheless a considerable number of visits to the beaches had been made by this group (see Table 8.1). In this segment, the 30-39 age group is overrepresented, as are families with children. The education level of the respondents is below average; the income level is in the median group.

There are few differences between the public transport and car trips. Notable are *Scheveningen*, *Hoek van Holland* beach, and the *Railway museum* as the destinations more attractive by public transport. All these destinations have a relatively good access by public transport, while car accessibility is relatively problematic. Members of this segment prefer *Walibi* and the *Open air museum* more by car. Destinations in Belgium, *Walibi* being one of them, are usually not very well accessible by train.

8.2.3. Segment #2: amusement parks

Figure 8.2 Preference results for segment #2 (amusement parks)

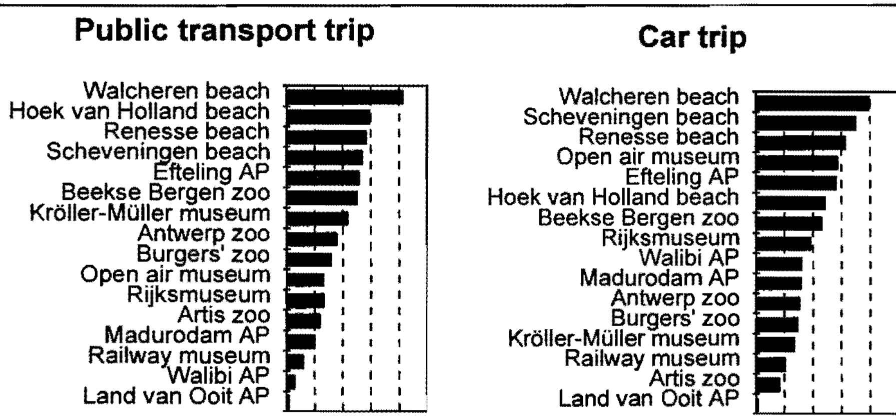


The second segment, with 21 individuals, consists of amusement park fans. The group's preference structure is comparable to that of the first segment, with the high preference for *De Efteling* as an remarkable feature. However, this group rather visits the other amusement parks instead of the zoos. Beaches receive the lowest preference values, but have been visited more often than zoos and museums. Naturally, beaches are free of charge, while zoos ask an entrance fee of some NLG 20, and museums charge NLG 10-15 per person. The socio-demographic profile of this segment is quite similar to that of segment #1; only age and income are slightly lower.

For car trips, this group seems to prefer nothing but *De Efteling*. The distance between *De Efteling* and the number two (*Madurodam*) almost equals the distance between number two and number last (*Rijksmuseum*). The public transport option does not increase preference for *De Efteling*; although it is still the leading destination, differences in preference with the rest are less.

8.2.4 Segment #3: beaches

Figure 8.3 Preference results for segment #3 (beaches)

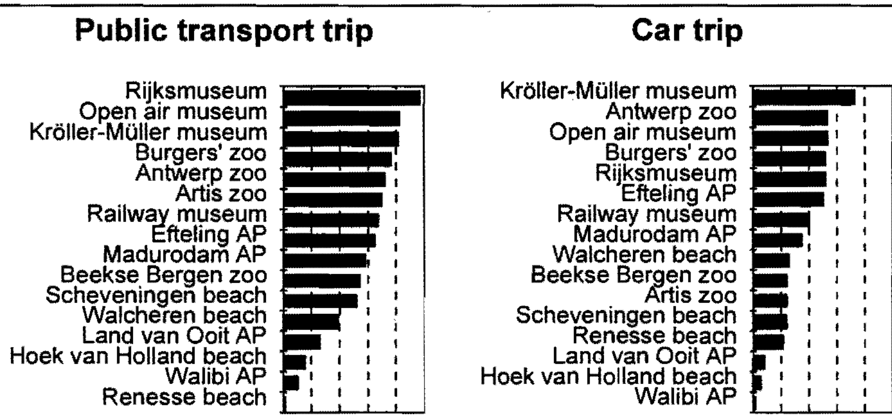


This group of 26 persons consists of genuine beach fans. They are exclusively attracted to beach locations, which is indeed reflected in their overt behavior. The education level of this segment is below average. Of the four segments, this group has the lowest participation rate in visits to the selected sites. *Hoek van Holland* beach is less preferred for a car trip, while the *Open air museum* performs better for a car trip. Remarkable is that the *Kröller-Müller museum* is more favored by train, while its accessibility by public transport is not very good.

8.2.5 Segment #4: museums

In this study the culturally interested group came out as the largest group: it consists of 63 respondents out of 150. The size of this segment indicates a certain bias in the sample; looking at for example recent patronage figures (cf. NRIT, 1995: 30) we would expect a smaller cultural segment. Members of this group primarily love museums, and to a lesser degree, zoos. Families with children are underrepresented, while income is above average, and education levels are well above average. Seventy-six percent of the museum segment (compared with 57 percent of the total sample) is over 40 years of age, while 43 percent (35 total sample) is over 50 years of age. These background variables are a possible explanation of the bias in the sample. It is likely that the bias is income- and education level-oriented; people with relatively high education and income levels would sooner respond to a research questionnaire.

Figure 8.4 Preference results for segment #4 (museums)



The *Rijksmuseum* is clearly the most preferred for the public transport trip, while this museum is only favored as fifth for the car trip. Obviously, the good public transport facilities of Amsterdam, and the busy traffic and parking problems of this city cause this difference. *Artis zoo*, also in the city of Amsterdam, shows the same pattern. For *Kröller-Müller* the opposite applies: this museum is the favorite for the car trip, and only third by public transport.

8.3 Segmentation validity

The segmentation and its results can be validated in a number of ways. First, the revealed choice of the segment members can be compared with their preference values for the presented selection of parks. Data on leisure participation of the respondents are available (Table 8.1), and demonstrate that revealed choice data for the four segments' past choices do not substantially differ from their stated preferences. Segment #1 indeed reveals a high preference for zoos and the *Efteling*. However, their visits to beaches during the past two years have been more numerous than would be expected on based on their preference data (see Figure 8.1). The revealed data of the segments #2 and #3 support the stated preference values for these groups. Segment #4 demonstrates the highest participation in museum visits of all segments, which supports our segmentation.

Table 8.1 Mean number of trips to 16 selected destinations, during past two years

segment	all	standard deviation	zoos	museums	amusement parks	beaches
Total sample	3.41	2.2	.81	.61	.89	1.11
#1 (Efteling/zoos)	3.42	2.1	**1.17**	.23	**1.03**	1.00
#2 (amusement parks)	3.05	2.7	.62	.43	**1.29**	.71
#3 (beaches)	2.92	1.9	.62	.27	.77	**1.27**
#4 (museums)	3.73	2.2	.71	**1.05**	.71	1.25

8.3.1 Segmentation significance

The segments differ in terms of their preference for leisure destinations. One would assume that the distinguished segments should be more homogeneous than the sample as a whole in terms of their preferences. Therefore, some additional analyses to test this hypothesis were performed. A first test involved running separate choice models. If the segments have different preference functions, a model incorporating segment-specific constants should perform better than the preference models for the total sample. A model with a segment-specific constant would of course still assume that the form of the preference function would be the same. Therefore, we also estimated a third model that allows the preference scales for the leisure sites to differ between market segments. Models were estimated for the public transport and car options separately.

Table 8.2a Comparison of models and their associated statistics, public transport

	G2[1]	DF[2]	# choice sets
model 1, without segmentation	637	15	96
model 2, segment specific constants	723	18	96
model 3, segment specific preference scales	2456	60	96

[1] G2=-2[LL(0)-LL(B)]; likelihood ratio test statistic, chi square distributed
[2] Degrees of freedom (# of parameters) associated with G2

Table 8.2b Comparison of models and their associated statistics, car

	G2[1]	DF[2]	# choice sets
model 1, without segmentation	495	15	100
model 2, segment specific constants	598	18	100
model 3, segment specific preference scales	2147	60	100

The results of this analysis are presented in Table 8.2. It demonstrates that adding segment-specific constants (model 2: 3 extra parameters) significantly (alpha < 0.001) improves the fit of the model for both the car and public transport options. Moreover, adding separate preference functions (model 3: 45 extra parameters), specific for each segment, increases the model fit for both the public transport and car options significantly (alpha < 0.001). The segment specific constants of the second model of Table 8.2 were tested for their significance. Table 8.3 shows that all are highly significant, which indicates that the segments make a meaningful distinction

Models with segment-varying preference functions perform better than the other model specifications. The market segments differ from each other in terms of preference. Thus, these results suggest that the derived market segments exhibit different preference structures.

Table 8.3 Segment significance, compared with the museum segment (model 3)

segment	public transport		car	
	t-stat.	Pr(Z>|t|)	t-stat.	Pr(Z>|t|)
#1 (zoos and Efteling)	-4.966	.0000	-6.971	.0000
#2 (amusement parks)	-7.424	.0000	-8.355	.0000
#3 (beaches)	-2.788	.0053	-2.481	.0131

8.3.2 Consistency of the segmentation

Another test is related to the consistency of the derived preference scales. We assumed that respondents belonging to the same segment would be more homogeneous than the total sample in terms of their preference for a particular type of leisure destination. Hence, we hypothesized that similar destinations will have similar positions on the derived preference scales. One way of testing this assumption is to examine the patterns of preference rankings for each type of leisure destination. In the ideal case, the first four rankings would all relate to the same type of destination, the second set of four rankings to another type, etcetera. That is, we are testing whether our segmentation is primarily driven by the type of destination. Therefore, a simple measure of consistency would be to take the observed total difference in preference rankings between all destinations belonging to a particular type, and express this as a proportion of the maximum range.

In the present study, the minimum total difference between 4 ranking positions of the destinations is 10. That is, distances are at a minimum if destinations A, B, C, and D rank successively. The distance between A and B then equals 1, between A and C 2, between A and D 3, between B and C 1, between B and D 2, and between C and D 1. Thus, the sum of all distances equals 10.

A completely inconsistent pattern would result in an observed distance value of 58, being the maximum sum of distances between four positions in the table of 16. The consistency value now is calculated from the following equation:

$$C_I = (D_{obs,\,i} - D_{min}) / D_{max}$$

where,

C_I =	the consistency value for destination *i* of type *I*;
$D_{obs,\,i}$=	the sum of observed distances between positions of all pairs of destinations;
D_{min}=	the minimum sum of distances between positions the ranking table;
$D_{max,\,type}$=	the maximum sum of distances between positions in the ranking table.

The consistency values for the four segments and the total sample are presented in Table 8.4. Values in this table vary between 0 and 1. Maximum consistency occurs when ranking distances between the four destinations are at a minimum within one type. The consistency value then equals zero.

The segments' preference patterns are more consistent than the sample as a whole. Segment #1 is the most consistent. A separate analysis of the leisure types shows that the segments' preferences are primarily consistent for the high ranking types. All preferences on the less preferred types are less consistent, which may suggest that the segments indeed are primarily based on destination types, and that trade-offs between type of destination and other attributes are more common for the less preferred type of destinations. Alternatively, the lower consistency of the less preferred types may also suggest some degree of indifference toward these types.

Table 8.4 Consistency of preference patterns

segment		zoo	museum	amusement park	beach
whole sample	transit	0.21	0.33	0.83	0.13
(N=150)	car	0.35	0.56	0.83	0.25
#1 (zoos, *Efteling*)	transit	**0.00**	0.23	**0.50**	0.44
(N=40)	car	**0.00**	0.31	**0.31**	0.00
#2 (amusement parks)	transit	0.42	0.42	**0.25**	0.17
(N=21)	car	0.06	0.63	**0.06**	0.00
#3 (beaches)	transit	0.19	0.25	0.52	**0.00**
(N=26)	car	0.31	0.56	0.44	**0.13**
#4 (museums)	transit	0.19	**0.25**	0.38	0.15
(N=63)	car	0.48	**0.21**	0.50	0.19

A value of zero denotes maximum consistency

8.4 Constraints per segment

The derived segmentation can be a useful marketing tool to identify consumers' preferences. One could argue that this segmentation scheme provides information about the latent demand for each of the identified destination types and the selected sites. Having identified these segments and their preference structures, the question then becomes relevant whether this latent demand can be actually realised, given the constraints the consumers are facing. In order to identify the impact of constraints, the next step of the analysis involved identifying the specific role of each of the elicited attributes in the respondents' decision making process, using the decision net approach.

The dimensions derived from the decision plan net task were used to identify constraints within each of the identified market segments. Rejection inducing dimensions were viewed as conditions which need to be satisfied to accept a destination. In other words, a trip that does not feature a particular rejection-inducing attribute at the acceptable level, will not be made. Because the decision nets were constructed for public transport and car trips separately, we were able to identify the specific rejection inducing dimensions for public transport trips, and hence evaluate car use reducing policies. This enabled us to demonstrate whether certain mode change strategies are feasible for particular market segments.

In principle, a constraints analysis can be performed at the level of individual respondents. Such an analysis would highlight the idiosyncracies of the respondents. In order to compare the findings between the car and public transport scenarios and between respondents, travel time, cost and number of transfers (in the public transport option) were introduced into the decision nets a priori (see Table 7.3). This categorization was used because the impact of policy schemes and marketing strategies will vary by constraint. Constraints originating from personal taste and aspirations are the least likely to be influenced, whereas a lack of time or money, or special requirements for children can possibly be overcome by policy measures.

Real travel time values were obtained from the official public transport time tables, measured between the public transport terminal closest from the respondent's home and the leisure site. Thus, allowing for driving or taking a taxi to the first major railway station, travel time and transfers to reach this station from home were not accounted for initially. The 'unlikely' label was for all trips that would not allow for one extra transfer or 30 minutes to reach the closest railway station from home. A trip that could not be realized within the maximum travel time or number of transfers as suggested by the respondent's decision net, was considered to be 'impossible'.

Table 8.5 Feasiblity of preferred leisure trips by public transport: travel time

segment	top 4 of trips	impossible	unlikely[1]	possible	possible /total
#1:zoo	Efteling	0	1	39	0.98
& Efteling	Burgers' zoo	6	7	27	0.68
(N=40)	Antwerp zoo	6	7	27	0.68
	Beekse Bergen.	1	3	36	0.90
#2:amu-	Efteling	0	0	21	1.00
sement	Madurodam	5	3	13	0.62
(N=21)	Land van Ooit	0	3	18	0.86
	Burgers' zoo	5	1	15	0.71
#3:	Walcheren	14	1	11	0.42
beach	Hoek v.Holland	13	1	12	0.46
(N=26)	Renesse	15	2	9	0.35
	Scheveningen	8	6	12	0.46
#4:	Rijksmuseum	11	8	44	0.70
museum	Open air museum	11	8	44	0.70
(N=63)	Kröller-Müller	19	5	39	0.62
	Burgers' zoo	9	5	49	0.78

[1] unlikely: not within 30 minutes (from home to station)

With this analysis of constraints we thus check whether consumer preferences can actually be realized. That is, one first has to determine whether a particular attribute is a rejection-inducing dimension, and then, if it is, whether the conditions pertaining to a particular leisure site act as a constraint, preventing consumers from choosing that destination. Here, we first consider the responses on the travel time and number of transfers attributes. Respondents have explicated their maximum acceptable values. These individual threshold values were compared against the objective attribute values of the top four destinations for the segment the individual belongs to (Table 8.5).

Table 8.6 Feasiblity of preferred leisure trips by public transport: travel time and transfers

segment	top 4 of trips	impossible	unlikely[1]	possible	possible /total
#1:zoo &	Efteling	0	4	36	0.90
Efteling	Burgers' zoo	10	8	22	0.55
(N=40)	Antwerp zoo	9	9	22	0.55
	Beekse Bergen.	1	5	34	0.85
#2:amu-	Efteling	0	2	19	0.90
sement	Madurodam	5	5	11	0.52
(N=21)	Land van Ooit	1	5	15	0.38
	Burgers' zoo	7	2	12	0.57
#3:	Walcheren	18	1	7	0.27
beach	Hoek v.Holland	14	2	10	0.38
(N=26)	Renesse	18	2	6	0.23
	Scheveningen	9	7	10	0.38
#4:	Rijksmuseum	12	15	36	0.57
museum	Open air museum	14	12	37	0.59
(N=63)	Kröller-Müller	27	6	30	0.48
	Burgers' zoo	13	8	42	0.67

[1] unlikely: not within 30 minutes from home to station, or no interchange between home and station

Among the four market segments, considerable differences occur in the ability to reach the favorite destinations by public transport. Segment #3 (beaches) has expressed the relatively highest demands for public transport trips. However, due to their expressed constraints, the top four preferred trips, all to beach locations, are impossible to reach within the limits provided by a group of respondents. Consequently, the favorite trips are possible for only half the segment. Furthermore, when in addition the maximum number of transfers (see Table 8.6) is also taken into consideration, this proportion drops even further: only a third of the segment can make the trips. Therefore, we may expect that car will be chosen instead of public transport. Similar trends can be observed for the other market segments, although in these cases, the absolute levels of the proportions are higher, often because the favorite leisure sites are located closer to the study area.

Table 8.7 Feasiblity of preferred leisure trips by car: travel time

segment	top 4 of trips	impossible	unlikely[1]	possible	possible /total
#1:zoo&	Efteling	0	0	40	1.00
Efteling	Burgers' zoo	0	2	38	0.95
(N=40)	Antwerp zoo	0	0	40	1.00
	Artis zoo	1	2	37	0.93
#2:amu-	Efteling	0	0	21	1.00
sement	Madurodam	1	1	19	0.90
(N=21)	Land van Ooit	0	0	21	1.00
	Open air museum	0	5	15	0.76
#3:	Walcheren	2	4	20	0.77
beach	Scheveningen	2	1	23	0.88
(N=26)	Renesse	2	4	20	0.77
	Open air museum	1	1	24	0.92
#4:	Kröller-Müller	0	6	57	0.90
museum	Antwerp zoo	0	0	63	1.00
(N=63)	Open air museum	0	3	60	0.95
	Burgers' zoo	0	3	60	0.95

[1] unlikely: not within 30 minutes of the threshold value

When traveling by car, few constraints are relevant, as is indicated by Table 8.7. To account for possible delays caused by traffic jams and parking problems, we considered a trip as unlikely within a margin of 30 minutes from the threshold value. As Table 8.7 shows, travel-time related constraints have far less impact on leisure trips by car. Again, segment #3 scores lowest, but still higher than the highest of the public transport scenarios. Whereas nearly all respondents are not constrained in time to make their favorite trips by car, a considerable number is constrained to make the most preferred trips by public transport.

Table 8.8 Rejection inducing dimensions (RID): public transport option

segment	mean N of rid's	% of respondents that score RID on category			
		site specific	quality transport	children, travel party	time/ time budget
#1: zoo, Efteling	3.4	75	40	50	32
#2: amusement	3.1	62	43	43	43
#3: beach	4.4	77	58	38	58
#4: museum	3.5	84	38	29	32

The segments' results related to other rejection inducing dimensions generally confirm the findings derived for the travel time and transfer attributes. Again, segment #3 (the beach lovers) emerges as the most constrained. The highest average number of rejection inducing dimensions is reported for this segment (see Table 8.8). This group scores high on the attributes of the public transport facilities (more than half of the segment reports rejection inducing dimensions on this category), and on time and distance aspects. A noteworthy proportion of segment #1 reports constraints related to children's requirements. A relatively large proportion of segment #4 mentions rejection inducing dimensions that specifically relate to the site.

8.5 Market segment strategies

The derived knowledge about the relevant preferences, constraints and background profiles of the segment members enables one to suggest relevant, segment specific marketing strategies. These can be expressed in terms of the appropriate planning or marketing and promotion initiatives to change mode choice behavior in favor of public transport. As the Figures 8.1 through 8.4 show, destinations well accessible by public transport tend to rank higher on the public transport list, while unaccessible destinations tend to perform better on the car option table. The segments show some differences on this point. While segment #1 (zoos, *Efteling*) does not differentiate that much between the two transport options, segment #3 (beaches) and #4 (museums) do distinguish more clearly between the public transport and car options. Again, it should be noted that deviations on the high ranking destinations are the most important; the respondents demonstrated an indifference toward the other, less preferred sites.

Using such results, the following policy strategies can be suggested to apply to the segments. Segment #1, the group of zoo (and *Efteling*) enthusiasts, primarily require capacity to accommodate families comfortably, because half of the constraints reported by this segment related to children, whereas only a third of this segment reports the attribute travel time as rejection inducing. As far as segment #2 (amusement parks) is concerned, Table 8.8 suggests that the four selected categories of rejection inducing dimensions are equally important to this small group of amusement park fans. As this group is largely similar to segment #1 (zoos, *Efteling*), the same strategy may apply. However, travel time is more important, as 43 percent of the group considers this as rejection inducing.

Segment #3, the beach fans, reports the highest number of rejection inducing dimensions. They have high demands for the public transport mode itself, and for travel time. Members of this segment have visited relatively few of the selected sites over the past two years. For this group, public transport connections with beach locations should not be complicated, easy to find and as direct as possible. Because of the relatively large distance from the respondents' homes to the beaches, a public transport experiment with this market segment will be difficult to implement (we must, however, realize that the results of this study are regionally biased). There is discrepancy between the public transport and car options, and a high proportion has rejection inducing dimensions on the public transport category. This suggests that unaccessible locations will not be traveled by public transport.

Finally, segment #4 (museums) is the highly active group of well-off, cultural seniors. Few constraints are reported, the most important of which are the site specific (taste) attributes. However, the group does make a clear distinction between the public transport and car options (cf. the ranking of *Rijksmuseum* in Amsterdam in Figure 8.3). It suggests that destinations well accessible by public transport are more likely to be visited by public transport. The appropriate promotion of these sites may support this result.

8.6 Conclusion

Market segments can be considered as target groups to whom the appropriate marketing mix of promotion, measures and other initiatives need to be applied. Programs are likely to have dissimilar effects on different types of leisure participants. Some of this variation may be explained by households' socio-economic characteristics, but leisure preference and constraints are likely to vary across socio-economic groups (e.g., Loker & Perdue, 1992; Spotts & Mahoney, 1991; Finn & Louviere, 1990). Therefore, we require segmentation into subgroups with coherent patterns of behavior to be targeted efficiently by specific (marketing) strategies. In this study, we therefore identified clusters of potential visitors of specific leisure destinations. The resulting segments are then described in terms of constraints and their demand of leisure trips by non-car transport. In addition, personal and socio-economic profiles of the segments support the development of marketing strategies.

In this study, market segments were formed on the basis of an integrated approach which simultaneously allows one to identify the attributes influencing leisure trip decisions, identify the nature of each of these attributes in general, and constraints in particular, position leisure destinations on a preference scale, and cluster respondents into market segments. The suggested methodology replaces a series of independent steps, based on unrelated methods. The findings of the present study and the experience obtained with administering this method suggest that it potentially offers a reliable and valid alternative to currently applied methods. It also is easy to administer and easy to use. Unlike the repertory grid method, it has the additional advantage that the elicited attributes are directly based on choices rather than perceptual dimensions. Consequently, the elicited attributes are likely to be more valid.

It should be emphasised, however, that the suggested method can be further improved. For example, the clustering of the respondents is still based on preferences. Constraints are used to describe the segments. Alternatively, one could develop a clustering algorithm that would take both preferences and constraints into consideration simultaneously. This might improve the managerial or policy relevance of the market segments as one would have segments that would be more homogeneous not only in terms of preferences but also in terms of constraints. Furthermore, the preference scaling model is based on first choice only. The suggested approach however also yields information about the least preferred alternative. Future research therefore will examine how this additional information might be analysed to derive preference functions.

In order to maximize the impact of car reducing initiatives, it is necessary to develop different strategies for the target groups. Therefore, having considered the socio-economic backgrounds of the segment members and their leisure practices, suggestions for separate strategies for the segments were outlined. Because the segments' preferences discriminate between the four selected leisure types, the strategies imply some relevant measures to be taken at the destinations, including fast and direct connections to museums. For public transport connections with amusement parks and zoos, accomodation for families (children) needs to be accounted for. Zoos located in well accessible cities have far better chances of attracting visitors by public transport. Since all market segments contain more unconstrained individuals than the modal split suggest (more people could travel by public transport than in the present situation), a promotion of the exisiting public transport alternatives may already achieve good results. The results of this study do not present measures to be taken at beach sites. The segment of beach devotees within our sample (region of Eindhoven/Tilburg), were severely constrained by the relatively great distance to the beach locations. We consider this as a local problem; those beach fans who live closer to the shores are probably less constrained to travel by public transport, assuming that they would express equivalent thresholds.

9 Modeling Constraints and Choices

9.1 Introduction

After having determined the necessary planning initiatives, the factors of the underlying choice decision process and the relevant market segments, the consumers can be confronted with the choice task that was outlined in chapter 6. The model that integrates both the constraints and preferences approaches will contain the elements of the previous chapters in order to measure the influence of preference factors and constraints factors and their mutual interactions, and to distinguish between different types of constraints. *Blocking* constraints (see chapter 6) were defined as those that intervene between preference and choice. In other words, these constraints overrule preference and thus preclude participation. *Circumstantial* constraints interact with the attributes of the choice alternatives and enable adaptation within the choice decision process: compensation by highly desired levels of other elements is possible.

The test of the theory involves a stated choice experiment, in which consumer response to a series of choice options is measured. *Stated choice models* or *conjoint choice models* (cf. Louviere & Timmermans, 1990) aim at deriving the utility function and choice rule that individuals apply in choosing between alternatives that are described in terms of an attribute profile. The choice decision process is represented by a carefully defined choice task. Respondents are presented with a series of hypothetical choice alternatives that are placed into choice sets. They are asked to choose choice alternatives from these sets. The choice alternatives are described by a number of a priori defined attributes with the relevant levels. In this study, single day leisure trips are described by these profiles. To represent potentially constraint-inducing elements, conditions under which the consumer could participate in the trip are varied. Responses to these variables determine their constraining nature. Statistical design methods are used to systematically vary the alternatives and the attribute levels in such a way that parameter values of the attributes can be estimated separately and independently. The utility of an actual choice alternative is a mathematical function of the part-worth utilities that result from the attribute levels, constraints, and an error term.

In this chapter, first procedures of sampling, segmentation, data collection and the experimental design are discussed. Next, results of the multinomial logit estimation procedure are presented. Tests of model performance and comparisons between model specifications are conducted. Finally, conclusions about the appropriateness and applicability of the constraint concepts are made.

9.2 Data

When confronting individuals with acts of planning in the hypothetical setting of a conjoint study, it is essential that these "choices to-be-made" closely reflect their real world choices. In other words, the specification of the alternatives and choice sets needs to mimic the actual choice situation as closely as possible. However, while constructing a stated choice experiment, one should keep in mind the trade-offs between analytical properties of the design, and the reliability of responses that depend on task size and complexity. Choice tasks too large and too complicated may cause respondent fatigue, and consequently responses may become unreliable. In this section we justify the trade-offs we made in constructing of the choice experiment.

9.2.1 Sample selection and market segments

Stated choice tasks need to be simple and straightforward to avoid respondent fatigue. The task therefore requires a limited number of alternatives and choice sets. Choice sets that closely relate to the respondents' actual choice situation should therefore not contain irrelevant alternatives. The market segmentation of the previous chapter demonstrated that certain day-trip attractions are very unlikely to be chosen by certain market segments. It would therefore be useful to apply such a segmentation to the choice experiment in such a way that respondents are presented with the relevant choice sets only. Because the present study was to be administered through a mail-back survey, previous knowledge about the preferences of respondents was required. Respondents of a recently conducted choice experiment (cf. Kemperman *et al.*, 1996) could be used for the present study.

To select the sample and segment the respondents for the present survey, the following procedure was followed. The data was collected in the Fall of 1994. A mail-back questionnaire was sent to a selected group of 4,500 family households with children living at home under the age of 18. This sample was selected from a commercial database that contained some 900,000 households, who fill out a questionnaire on a variety of topics every three years. Fifty percent of the 4,500 completed the questionnaire. Eighty percent of these respondents volunteered to participate in the data collection of the present study.

Finally, 1,835 respondents were available for another round of data collection. This sample was *a priori* segmented into preference groups similar to those of chapter 8. The data of the first experiment involved responses on choices for specific day-trip destinations: amusement parks, museums and zoos. Beach locations were not specified in this choice experiment, and, for practical reasons, we subsequently dropped these for the present study. Therefore, the ideal market segmentation should result in:

- a group with a high preference for both amusement parks and zoos (segment #1 in chapter 7);
- a group with a specific preference for amusement parks alone (segment #2);
- group with a specific preference for museums (segment #4).

Table 9.1 Park choices for different market segments

	segments						excluded group	
	museum		variety		amusement			
N	**410**		**525**		**585**		**315**	
	mean	*SE*	*mean*	*SE*	*mean*	*SE*	*mean*	*SE*
choice *not to go*	1.61	0.10	1.44	0.08	1.50	0.07	**10.21**	0.17
variety between types	1.71	0.10	**4.78**	0.10	3.78	0.09	0.49	0.05
amusement parks								
Duinrell	0.28	0.03	0.64	0.04	**1.90**	0.07	0.28	0.04
Efteling	0.89	0.07	**2.06**	0.08	**3.92**	0.09	1.10	0.10
Hellendoorn	0.18	0.02	0.65	0.04	**1.27**	0.06	0.27	0.04
Walibi Flevo	0.30	0.04	0.65	0.04	**1.76**	0.07	0.32	0.05
total	1.65		**4.00**		**8.85**		1.97	
museums								
Archeon	**1.34**	0.10	0.63	0.05	0.56	0.05	0.36	0.05
Kröller-Müller	**0.89**	0.09	0.42	0.04	0.12	0.02	0.29	0.05
Open air museum	**0.77**	0.07	0.50	0.04	0.32	0.03	0.31	0.06
Omniversum	**1.00**	0.08	0.87	0.05	0.42	0.04	0.30	0.04
total	**4.00**		2.42		1.42		1.26	
zoos								
Artis	0.41	0.04	**1.40**	0.07	0.64	0.04	0.36	0.05
Burgers' zoo	0.46	0.04	**1.94**	0.07	0.78	0.05	0.43	0.05
Dolfinarium	0.40	0.04	**1.83**	0.08	0.98	0.05	0.37	0.05
Noorder zoo	0.57	0.05	**2.24**	0.08	0.93	0.05	0.49	0.06
total	1.84		**7.41**		3.33		1.65	

Based on the responses to the park type experiment, we segmented the respondents into four groups: a museum segment, that clearly expressed a preference for museum visits, an amusement segment that prefers amusement parks, and a segment of variety seekers, interested in both zoos and amusement parks. These variety seekers chose different types of parks within a choice situation. The fourth segment consists of a group without any specific preference for any of these attraction types. The choice experiment involved a choice task of 10 choice situations. Respondents were presented with choice situations in which parks were varied for the spring and summer seasons separately; they were asked to make park choices for each season. From the response to this experiment, the following variables were used for a clustering procedure: *(i)* frequency of museum choice, *(ii)* frequency of amusement park choice, *(iii)* frequency of zoo choice, *(iv)* frequency of base alternative choice, and *(v)* frequency of varied choice, defined as a situation when the choice of destination type in spring and summer were not identical. The segments and results on the segmentation variables are demonstrated in Table 9.1.

Although these respondents were from a different sample than those of chapter 7 and 8, segment profiles are similar. The museum segments has the highest average age, and the highest income and education levels. Members of the amusement segment are typically youngest on average, and have a lower income and lower level of education. The variety seeking segment rates in between the two other segments for these background variables. Education and income level of the excluded segment are lowest, and the members of this segment are relatively old.

Table 9.2 Response rate for the three distinguished segments (questionnaire March 1995)

	N selected	N completed and returned	response rate
museum segment	410	260	.63
variety segment	525	367	.70
amusement segment	585	377	.64

Together, the three segments amount to 1520 individuals who were selected for participation in the data collection of the present study. The remaining 315 respondents were dropped from the sample. The questionnaire was mailed in March 1995. Two thirds of the addressed individuals returned a useful questionnaire; response rates differed slightly across the three market segments (see Table 9.2).

9.2.2 Attribute elicitation

A stated choice experiment involves a series of choices between alternatives with specified attribute profiles. Given the specification of the attributes, choice alternatives must be constructed such that they are relevant to the research questions, and, moreover, such as to reflect the respondents' real world considerations. The first requirement would involve the inclusion of transport mode in the specification of choice alternatives. As in the previous two chapters, only the car and train options were considered.

Table 9.3a Attraction destinations for the museum segment

Rijksmuseum, Amsterdam	RIJK
Museum Kröller-Müller, National Park Hoge Veluwe	KRÖL
Open Air Museum, Arnhem	OPEN
Archeon Archaeological Theme Park, Alphen aan de Rijn	ARCH

To further specify the day-trips, the results of the qualitative exploration of the choice situation were used. The numerically most important attributes related specifically to the site. As these are not relevant in this study, we did not specify any of those site specific attributes. Similar to the first data collection, we took some well-known attraction destinations and varied these in the choice situations. Tables 9.3a, b and c show the destinations that were selected for this choice experiment. Each segment had four destinations. All three segment groups received identical questionnaires, only varying in terms of the specific destination alternatives. Different sets of destinations were specified for each segment: four amusement parks (segment #3), two amusement parks and two zoos (segment #2), and four museums (segment #1).

In the selection of these destinations, the geographical situation in the Netherlands was an important criterium: we aimed at spreading the destinations evenly across the country. Extensive descriptions of the sites are given in chapter 10. The selection of destinations is different from the first data collection. The first round of data collection involved a regional sample (in the south of The Netherlands). In this case, a national sample was taken. Destinations in Belgium were subsequently dropped, and some in the far northeast (*Noorder zoo* in Emmen, and *Adventure park Hellendoorn*) of the country were added. *Archeon* (museum) and *Walibi Flevo* (amusement park) are newly developed attraction destinations, that were not yet available during the qualitative data collection.

Within the profiles, we alternated trip attributes for each transport mode option (car or train). The first group of attributes can be considered as choice incentives: potential acts of planning to motivate consumers' mode change. Another group of important attributes operate as conditions: these cannot be influenced directly by acts of planning, but are nevertheless of essential importance. These conditions may operate as constraints. For example, travel party was mentioned as an important variable (see chapter 7). Tourists may be constrained to participate in a leisure activity, e.g., visiting a museum, when children are present in the travel party. In other words, children in the travel party is a potential constraint. Planning has no influence on the tourists' decisions whether to bring children or not. Planning must operate within the consumers' chosen travel parties as a given condition. A similar argumentation applies to the weather condition, and for the time that the consumer wants to leave home for a day-trip: these can hardly be manipulated by planning, but are nevertheless important. These conditions can operate as constraint-inducing, i.e., participation may be affected negatively.

Table 9.3b Attraction destinations for the variety seeking segment

De Efteling, Kaatsheuvel	EFTE
Walibi Flevo, Biddinghuizen	WALI
Burgers' Zoo, Bush and Safari, Arnhem	BURG
Noorder Dierenpark (Zoo), Emmen	NOOR

Three 2-level variables were introduced as constraint-inducing conditions (see Table 9.4): travel party (children/no children), weather, and departure time. All three conditions may be important for the choice between certain parks, but also for the decision whether or not to participate at all. Certain parks are specifically targeted to children, others may be completely inadequate for children, implying that the travel party condition may operate as a circumstantial constraint. In other words, a destination other than the normally most preferred one may be chosen under this specific condition. However, travel party may also act as a blocking constraint. For instance, baby-sitting may not be available, forcing the parents to stay home. Departure time may also be either a blocking or a circumstantial constraint. If one cannot depart before noon, some destinations may be excluded from one's choice in that not enough time is left to experience the park. In contrast, other attraction destinations may not require a full day for enjoyment. It depends on one's own taste if this full day is needed. In other words, in this case interaction with taste attributes determine this constraint to be circumstantial. Travel time, however, plays a crucial role here and may operate as a blocking constraint. It depends on the home location or the availability of time for the rest of the day whether the consumer feels that this half day enjoyment can still be achieved. The third condition variable, the weather, is also a potentially blocking or circumstantial constraint. Bad weather may, for instance, be a reason to stay at home, but may also be a reason to choose something other than the normally preferred destination. It must be noted that the specified conditions may not operate as a constraint at all, but the model will be tested for this to be the case.

Table 9.3c Attraction destinations for the amusement segment

De Efteling, Kaatsheuvel	EFTE
Walibi Flevo, Biddinghuizen	WALI
Duinrell, Wassenaar	DUIN
Adventure Park, Hellendoorn	HELL

In addition to these three contextual variables, we specified attributes that describe the choice alternatives. For the car alternatives three incentive attributes were specified: a measure for travel time and delay, parking space availability and parking cost. Four incentive variables were specified for the train alternatives (see Table 9.4): a measure for travel time and delay, similar to that of the car alternative, a variable for train connections, the availability of a shuttle service, and the possible upgrade of the train ticket.

Table 9.4 Attributes of the choice model

Constraint-Inducing Conditions		
	coded +1	coded -1
	Take Children On Trip	Do Not Take Children On Trip
	Time Of Departure: Noon	Time Of Departure: 9 AM
	Good, Sunny Weather	Bad Weather
Incentive Variables		
	coded +1	coded -1
Car	*no delay*	*expected delay 30 minutes*
	free parking	*parking dfl 2 per hour*
	easy parking	*parking spaces hard to find*
Train	*no delay*	*expected delay 30 minutes*
	direct train connection	*transfers required*
	fixed price shuttle service	*no shuttle service*
	free train ticket upgrade	*no upgrade*

Travel time, being an important characteristic for any trip, needed to be included. However, because our sample was spread evenly across the country, it was impossible to realistically specify absolute travel times. For instance, the specification *'a full hour's drive to the Rijksmuseum'* would be a very fast trip for someone from the city of Maastricht, but an extremely slow one for any traveler from Amsterdam. A possible formulation to overcome this problem would be to specify relative travel times as, for instance, *'twice the normal travel time'*. A disadvantage of this approach would be that people would need to take extra efforts to calculate the relevant attribute levels. Moreover, a doubling of travel time may be extremely problematic and perhaps unrealistic when traveling from the country's west to, for instance, *Noorder* zoo in Emmen. For this trip it would amount to a delay of some 2 and a half hours. It was for those reasons that we specified *expected delay* instead of travel time. For any car trip, a delay of half an hour (for example, traffic jams) is feasible and can be grasped by the respondent. Similar to traffic jams, half hour delays may happen on any train trip. For example, a connection may fail. Most trains run twice an hour. Ensuring train trips without delays is a possible initiative.

Parking variables play an important role in the preference judgment of a car trip. The availability of spaces, and the cost of parking influence mode choice. Mode choices may be manipulated by parking price, or by limiting parking availability. Parking costs differ greatly across the country. Spaces in city centers are heavily priced, while large attraction destinations at peripheral locations may have free parking. We specified a compromise price of 2 guilders per hour (as opposed to free parking), which may be cheap for Amsterdam, but will still be unattractive for any large theme park outside a city center. Availability of parking space was specified in terms of *parking ease:* when parking space is abundantly available, it will be easy to find a spot. On the other hand, if park management would decide to cut down the availability of parking space, finding a space will become harder.

Train trips would potentially be improved by avoiding transfers to offer a trouble-free, direct connection from the local station to the destination. Shuttle services (the so-called *train-taxis*) are taxis that provide transport from the station to any destination within a given range for a fixed price. These services are usually more comfortable than public buses, and cheaper than taxis. Many cities in The Netherlands, apart from the three largest, now have those services running. Trains in The Netherlands provide first and second class seats, where the first class tickets are 50 percent more expensive. NS experimented for some time with cheap weekend upgrades from second to first class. A first class ticket would possibly enhance the trip's comfort. However. the experiment was canceled for no clear reason. Still, we decided to include a free ticket upgrade in the experiment. This upgrade was presented as being directly joined to the attraction destination.

Respondents were to imagine to buy a combined train and entrance ticket at the home station.

9.2.3 Hypothetical choice task

Respondents were asked to imagine themselves at the beginning of a day on which a day trip might be made. We asked them to imagine the condition variables as the circumstances of this day, and presented them with a hypothetical choice situation. A choice alternative consists of a destination site, a transport mode, and the associated incentive variables. The constraint-inducing conditions were varied across the choice sets, while the incentive variables were varied across the choice alternatives. Each choice set features one profile of conditions, and a varying number of choice alternatives.

Figure 9.1 Example of a choice set

Take children	Departure at 9 AM		Sunny weather
If you could only choose from the following options, which day-trip would you pick?	O	**by car to** *de Efteling*	expected traffic jam of 30 minutes free parking parking space easy to find
	O	**by train to** *Walibi Flevo*	no delay direct connection no shuttle service free ticket upgrade
	O	**do not go**	

For each presented choice set, we asked the question: *what would you pick if you could only choose between the following alternatives?* An example of a questionnaire choice set is shown in Figure 9.1. The base alternative was formulated as *do not go*. This neutral formulation does not force people to stay home, but rather enables them to do anything else than making a day trip.

9.2.4 Design strategy

The estimation of the constraints model imposes a number of requirements on the factorial design. Parameters for both circumstantial and blocking constraints must be estimated. That means, first, that the design should enable the estimation of interactions of the constraint-inducing variables with all other attributes of the model. Significant values for these interactions are suggestive of the importance of circumstantial constraints. Secondly, the design should enable the estimation of the effects of the constraint-inducing conditions. Significant parameter values in this case would reflect the importance of blocking constraints.

A further requirement of the factorial design is that a segmentation of respondents should be possible. Interesting subsegments may be found within the *a priori* distinguished market segments. For instance, a group willing to change from car to transit could be distinguished from an unwilling subsegment. In this case, one would segment on the incentive variables, and on the transport mode atribute. Another potentially interesting subsegmentation would be on the responses to the presented (potential) constraints. The constraint-inducing variables would then be required as the input variables for the segmentation.

Thus, the design must satisfy the following conditions:

(i) main effects of the incentive variables can be estimated for each destination alternative separately at the aggregate level;

(ii) main effects of the destination alternatives can be estimated at the aggregate level;

(iii) main effects of the transport modes, for each destination alternative separately, can be estimated at the aggregate level;

(iv) interaction effects between constraint-inducing condition variables and the destination alternatives can be estimated at the aggregate level;

(v) interaction effects between constraint-inducing condition variables and transport modes per destination alternative can be estimated at the aggregate level;

(vi) interaction effects between constraint-inducing condition variables and the incentive variables for each destination alternatives can be estimated at the aggregate level;

(vii) main effects (constants) of these constraint-inducing variables can be estimated at the aggregate level;

(viii) interaction effects between levels of the blocking constraints can be estimated at the aggregate level;

(ix) identical questionnaires are presented to the respondents; that is, parameter values are mutually comparable.

To satisfy all these conditions, a fractional factorial design of 1024 profiles was constructed. The construction of this experimental design involved eight alternatives and two subdesigns: a subdesign for the condition variables, and a subdesign for the transport mode-incentive variables. It involved the following procedures:

(1) The 8 alternatives: 4 destinations multiplied by 2 transport modes (car and train). This construction allows us to estimate specific parameters for the destinations and transport modes separately and independently, thus satisfying conditions *(ii)* and *(iii)*.

(2) The subdesign for the (constraint-inducing) condition variables involved a full factorial (2^3) design of 8 profiles. This allowed us to estimate the main and interaction effects of these condition variables (i.e., blocking constraints) at the aggregate level, thus satisfying the conditions *(vii)* and *(viii)*.

(3) The car and train alternatives were described by the incentive variables, 3 for a car alternative and 4 for a train alternative. A 2^3 factorial design (8 profiles) describes the car alternatives. Similarly, to describe the train alternatives, a fractional factorial design (2^4) of 8 profiles was used.

The descriptions of the car and train alternatives were specifically coded for the destination and transport mode alternatives, thus satisfying condition *(i)*. This involved the multiplication of the alternatives and the incentive variables. In order to measure the influence of circumstantial constraints, the interaction effects between the condition variables and all other variables (destinations, transport modes, incentives) need to be estimated. By multiplying the subdesign *(2)* of the condition variables with the alternatives and subdesign *(3)* of the incentive variables, these condition *(iv)*, *(v)* and *(vi)* were satisfied. This multiplication of the three separate subdesigns into the total experimental design, results in a total design of (condition variables) * (car incentives + train incentives) * (alternatives) = 8*(2*8)*8 = 1024 profiles.

The next step involved the allocation of the profiles to choice sets (see Figure 9.1). Choice sets consisted of either one or two profiles, and a base alternative (do not go). The choice sets of one alternative only plus base were presented to force the choice between participating and not participating, without a third alternative as a way out. Each choice set contained only one condition profile, i.e., the constraint-inducing variables had the same levels for all alternatives in the choice set. Within each choice set of two profiles, we included both the train and the car option. Profiles were assigned to the choice sets in such a way that destinations and transport modes were evenly distributed among the choice sets.

Obviously, 1024 profiles is too great a number to be presented in one questionnaire. Therefore, the design was blocked into subdesigns of an acceptable size for each respondent. In order to fulfill condition *(ix)* each respondent received an orthogonal subdesign. Each respondent was expected to be able to complete a questionnaire of 40 choice sets. The 40 choice sets for each respondent contain a total of 64 profiles, with 16 sets of one profile (plus base alternative), and 24 of two profiles (plus base alternative).

To facilitate the completion of the questionnaire, the 40 choice sets were presented on 4 different pages, each page consisting of 10 choice sets. For each page, one profile of the condition variables was presented. The design structure of such a questionnaire is shown in Figure 9.2. Every separate page of the questionnaire featured 10 choice sets, the orthogonal fraction of the combined 2^3 incentive subdesign (car) and the 2^4 incentive subdesign (train). To each of the 10 choice sets, was nested under one of the condition profiles (*a* through *d* and *e* through *h*). The next pages were variations on this theme, with the next profile from the condition subdesign, and a new orthogonal incentives profile. Each questionnaire thus featured 4 pages, to satisfy conditions *(ix)*. Each page consists of 16 profiles, divided among 4 destinations and 2 transport modes, placed into 10 choice sets, within one condition profile.

Figure 9.2 Design structure of questionnaire for one respondent

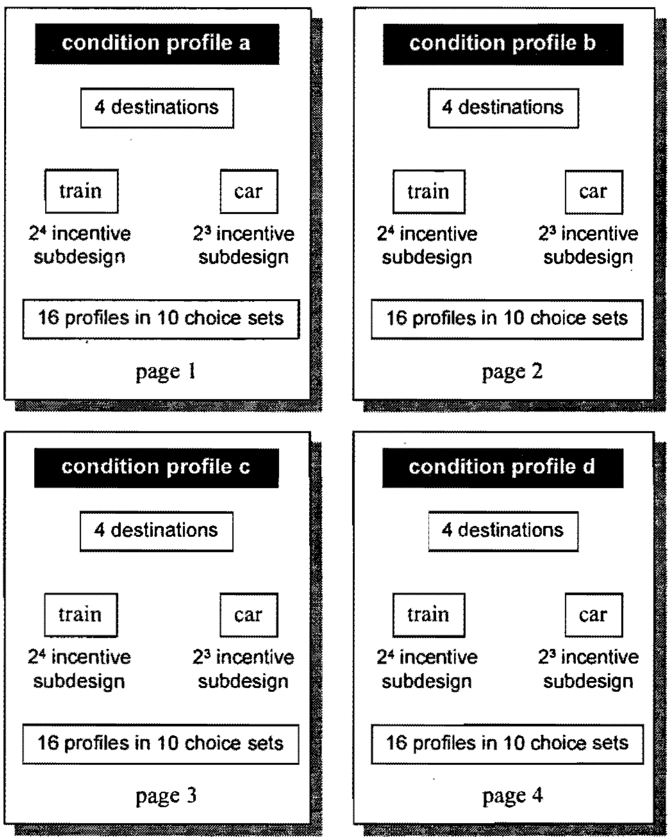
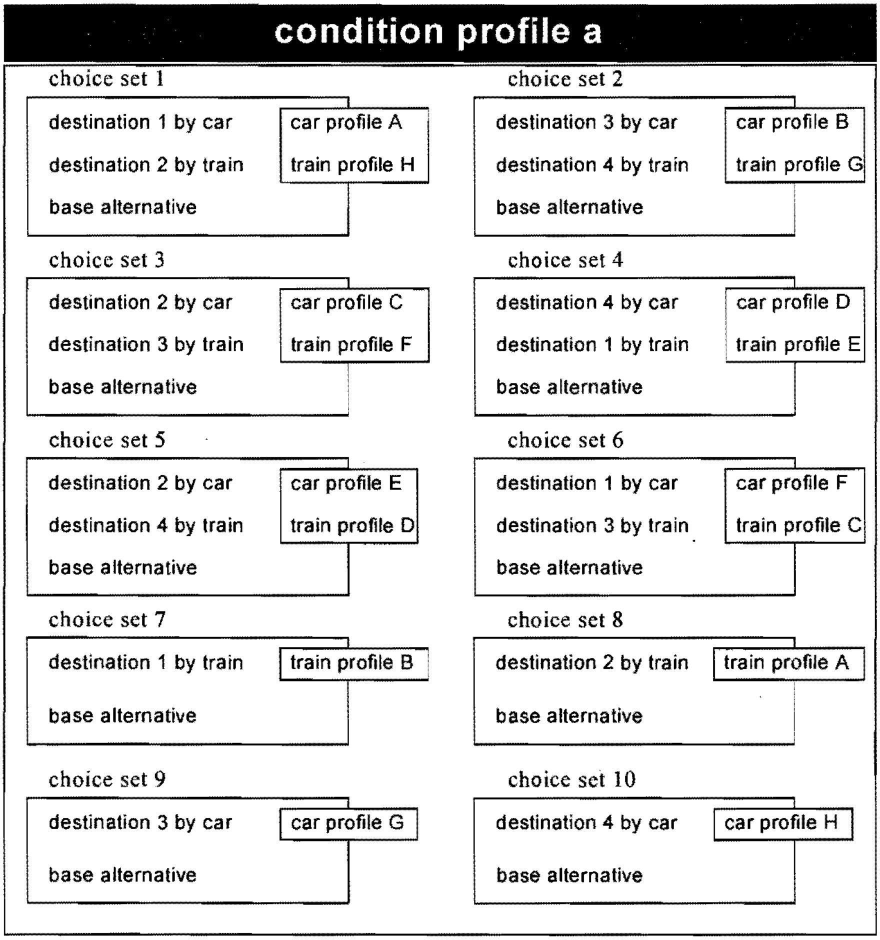


Figure 9.3 shows page 1 of the questionnaire in detail. Car profiles A through H (from the 2^3 incentive subdesign) and train profiles A through H (from the 2^4 incentive subdesign) were used to describe the choice alternatives. For condition profiles b and further, variations of the subdesgins were used.

Figure 9.3 Design structure for condition profile a



9.3 Model estimation results

Parameter values for all conditions and attributes were estimated through iteratively least-square analysis. The estimated parameter values for all three segments' models are shown in Appendices C.1 through C.3. RhoSquare values of the three segments' models vary between 0.3 and 0.4, indicating that the models fit the data well (Ben-Akiva & Lerman, 1985; Intelligent Marketing Systems, 1993).

Effect coding was used for all 2-level variables. All negatively formulated levels were coded -1 (see also Table 9.4), and all positive levels +1. Note that for the condition *departure time* 9.00 AM was coded -1, and noon +1. With the assumption of linearity of 2-level attributes in the model, we can suffice with the positive formulation of the attribute in the tables of estimation results (see Appendices C.1 through C.3). Destination was effect coded as a 4-level attribute.

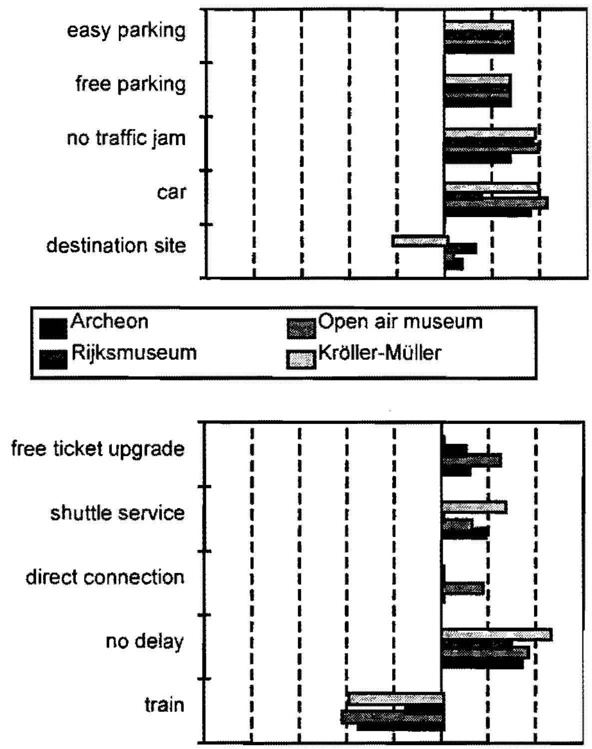
The *free parking* attribute is rated equally high for all four destinations. The same occurred for *parking ease.* We therefore brought forward the hypothesis that these attributes are independent from the specific destination: people prefer free and easy parking anywhere, no matter which park or museum. Hence, we tested and compared a model that was constrained to equal the four parameter values for each destination.

9.3.1 Museum segment

Figures 9.4 a and b and Appendix C.1 show the estimation results for the museum segment. Of all destinations presented, the *Kröller-Müller* museum is clearly the least preferred of the four destinations. The estimation results show that the car is the most favored mode of transportation, for all destinations. There are however differences in the strength of the transport mode parameters. While the variety and the amusement segments value transport mode with a score of around 0.5 for all destinations (Figures 9.5 and 9.6), the museum group shows lower parameter values. These lower values indicate less importance for the car as transport mode for museum trips.

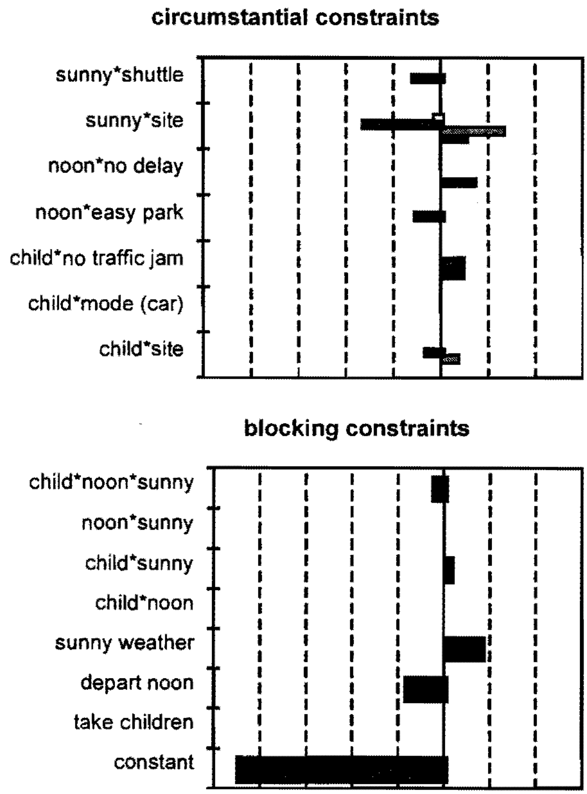
The *Rijksmuseum* parameter estimate for transport mode is close to zero, implying that the choice between car and train here is hardly essential. In fact, the *Rijksmuseum* is the most urban destination of all, with relatively good access to public transport facilities, and the usual metropolitan car transport problems. *Parking ease* is relatively more important to the museum segment than to the other segments; this may be attributed to the above average age for members of this group. *No traffic jam* is the most important of the car attributes for three of the four museums.

Figure 9.4a Museum segment, model estimation results for main effects



No delay (train) is the most important attribute for the train alternative. For the *Rijksmuseum* delay by car is valued more important than delay by train, while the opposite is true for *Kröller-Müller*. Again, this may be attributed to the highly urban location of the *Rijksmuseum*. In comparison with the other attributes, delay is by far the most important. A *direct connection* as opposed to the *required transfer* is not valued importantly. Moreover, for three museums this attribute has no significant influence at all. *Shuttle service* has a significant parameter value for *Archeon* and the *Open air* museum. The latter museum normally has an infrequent bus connection from the two nearby train stations, Arnhem and Ede-Wageningen, hence the high value of the shuttle service. *Free ticket upgrade* is especially important for a trip to the *Open air* museum.

Figure 9.4b Museum segment, model estimation results for constraints



When considering a choice between the alternatives, the presented condition levels may drive the decisions toward one of the alternatives. For example, the outlook of rainy weather could make a park with indoor facilities more favorable and thus direct the consumers' choice toward that particular alternative. An example of this effect is shown by the strong negative parameter value for the interaction of *Rijksmuseum* with *weather condition*, and the strong positive value for the interaction of the *Open air* museum with this condition. Conditions may also have an influence on the evaluation of, e.g. the shuttle service. The negative interaction effect of *sunny weather* and *shuttle service* for the *Rijksmuseum*, while there is no significant main effect of *shuttle service*, indicates that people prefer this shuttle service only in case of bad weather.

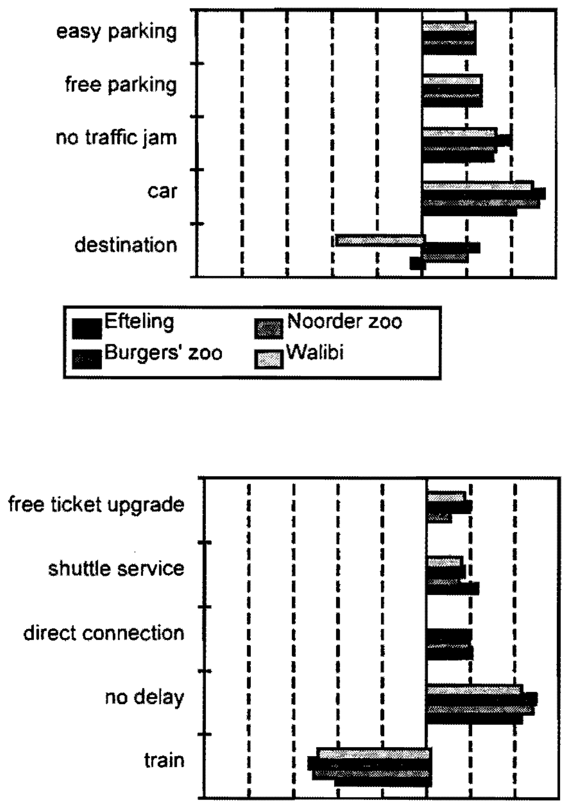
Interaction parameter values of the *Rijksmuseum* in Amsterdam demonstrate the eccentricity of this destination: the *Rijksmuseum* profits strongly from bad weather. There are few interactions of *Take children* with the attributes of the museum alternatives. *Late departure* to the *Archeon* is preferred when the train is not delayed. Note that there are no interactions of the condition variables with transport mode. There is no apparent direct effect of the conditions on the transport mode choice.

The museum segment takes less notice of these condition variables (operating as blocking constraints), as compared with the other two segments. For this group, the *Take Children* condition has no significant effect. In other words, whether or not children are in the party, it does not block participation to this trip in any way. The value of the blocking constraint *depart noon* is negative, which indicates a preference for early departure.

9.3.2 Variety seeking segment

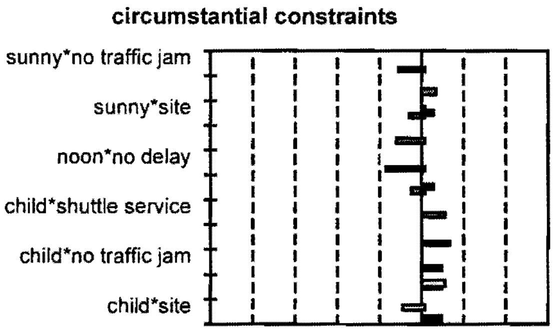
Figures 9.5 a and b and Appendix C.2 show the estimation results for the variety seeking segment. Of all destinations presented, the *Walibi* amusement park is clearly the least preferred of the four. The group further shows a distinct preference for the zoos, as opposed to both amusement parks. As in the museum segment, the car is favored for all destinations. *No traffic jam* is the most important car attribute to all destinations, evaluated with parameter values of around 0.3. *Expected delay (train)* however, is awarded with parameter values higher than the *expected delay (car)* attribute. When a 30 minute delay of the train service could be foreseen, the utility of the choice alternative decreases dramatically. With the linearity assumption of this 2-level variable, the *no delay expected* will increase the alternative's utility equally.

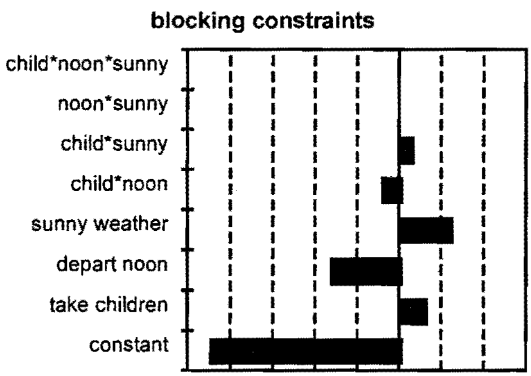
Figure 9.5a Variety seeking segment, model estimation results for main effects



Some interactions of *Take children* with the attributes are somewhat more important for the variety seekers. *No delay (train)* for example is extra favorable with children in the party to the *Efteling*. With *early departure*, delay is apparently considered even more of a nuisance for this destination. Also with *early departure*, a *ticket upgrade* is more favored for *De Efteling*. As a blocking constraint, *departure time* (noon) is of great importance to the variety segment. The weather condition also has a considerable effect, whereas the effect of children in the party is less important.

Figure 9.5b Variety seeking segment, model estimation results for constraints

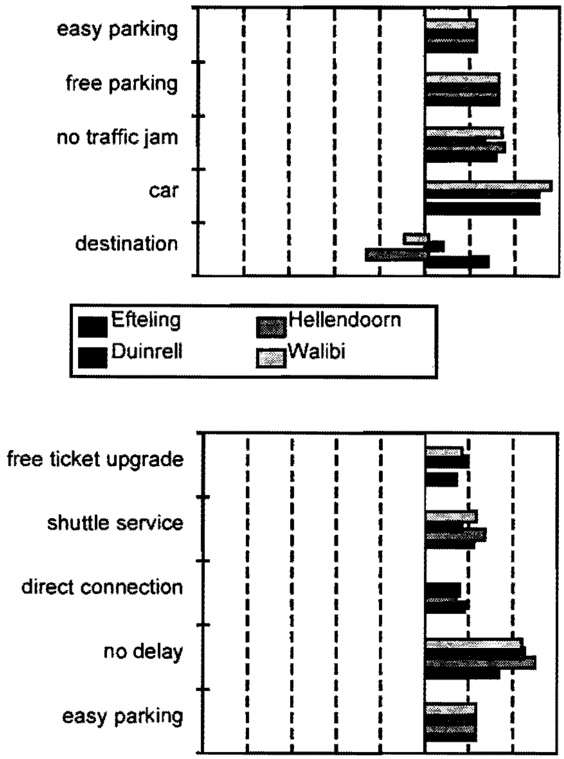




9.3.3 Amusement segment

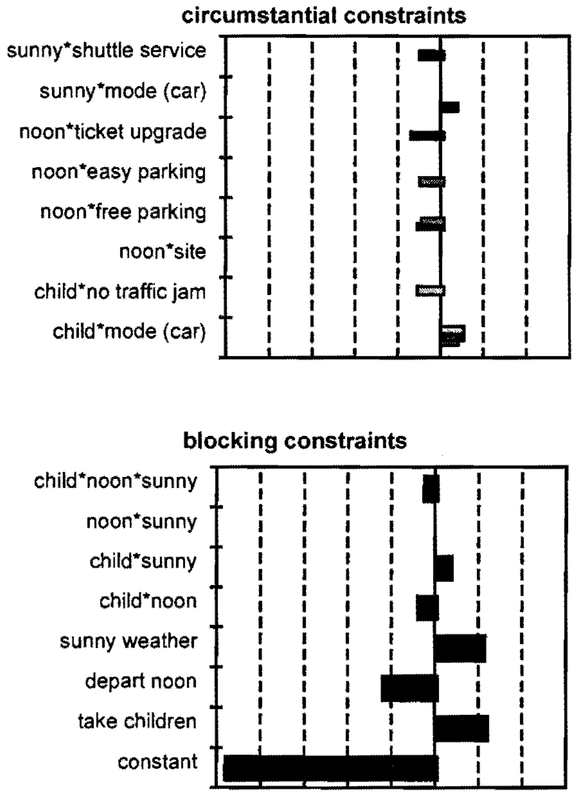
Figures 9.6 a and b and Appendix C.3 show the estimation results for the amusement segment. Of all destinations presented,. the *Hellendoorn Adventure* park is clearly the least preferred of the four, and the *Efteling* is evaluated as the far most attractive amusement park. Car as mode of transport is favored for all destinations, as in both other segments, but stronger. *Free parking* and *no traffic jam* are more or less equally important. *No delay* (train) is evaluated as more important than the *no traffic jam* attribute for all destinations. *Shuttle service* receives relatively high values.

Figure 9.6a Amusement segment, model estimation results for main effects



The amusement segment does not show strong interaction effects of either condition with the attributes. As blocking constraints, however, all three conditions are highly important. Some parents in this segment may regard amusement parks for children and do not particularly like visiting these themselves. They would therefore not go on a given trip to an amusement park without their children. The high value of the *Take children* condition for this amusement segment indicates the blocking nature of this condition. In other words, the fact that the children are not in the party, to a certain degree blocks participation to this trip. The estimated parameter values for the condition interactions are relatively low. In other words, the combined occurrences of condition levels have little importance.

Figure 9.6b Amusement segment, model estimation results for constraints



9.4 Hypotheses: model comparisons

Following the conceptualizations of constraints, three different model restrictions can be specified. First, a model without constraints was estimated. This is the base model, equation (6.2) in chapter 6 refers to this **no constraints model**. The model assumes that constraints do not play any significant role, i.e., choices are not affected by the conditions as presented in the choice task. Secondly, a **blocking constraints only model** was estimated. Equation (6.7) refers to this model. This model assumes that conditions play a role only as choice-precluding factors. Interactions between these constraint-inducing variables are estimated as well.

These are interpreted as whether, for example, the combination of sunny weather and early departure affects choice, apart from their main effects. Thirdly, the **circumstantial constraints only model** (equation (6.9)) assumes that blocking constraints are not valid, but only constraints that interact with the other variables of the model. This model includes all significant interactions of conditions with the attributes. Finally, the **all constraints model** (equation 6.10) comprises both the blocking component and the circumstantial one. Table 9.5 displays all four models and shows the elements that are included in the specifications.

Table 9.5 Model specifications compared

	no constraints	blocking constraints	circumstantia l constraints	all constraints
equation (chapter 6)	(6.2)	(6.7)	(6.9)	(6.10)
all main effects	●	●	●	●
condition specific effects (blocking constraints)		●		●
interactions of conditions * attributes			●	●

We can compare the constraint concepts by comparing the different model specifications. This AIC test, however, only applies to models where one model is a restriction or an extension another model (Ben-Akiva & Lerman, 1985: 171). Thus, only models with variables added to the base model or with variables removed from the composite model can be tested. A blocking constraints only model can therefore not be tested against the circumstantial constraints only model with this test.

In this section, hypotheses about the performance of the models are formulated. These hypotheses are tested using the Akaike Information Criterion (AIC). AIC is an expression of the model's relative increase in log-likelihood (Akaike, 1973; Ben-Akiva & Lerman, 1985: 169), corrected for the degrees of freedom. The AIC is chi-square distributed; the model for the same data set with the significantly lower value of AIC is to be preferred. The degrees of freedom remaining are equal to the difference in number of parameters for the successive models. The equation is as follows:

$$AIC = LL(B) - k \tag{9.1}$$

where,

LL(B) = the model's log-likelihood, and

k = the number of parameters of the model.

The better model has a higher value of RhoSquare (AIC). This is a goodness-of-fit measure, akin to the R^2 in regression, derived from the AIC. (Ben-Akiva & Lerman, 1985: 171). It expresses the relative increase in log-likelihood from the zero model. The equation is as follows:

$$RhoSquare(AIC) = 1 - \frac{AIC}{LL(0)} \tag{9.2}$$

where,

LL(0) = the model's log likelihood before estimation of parameters (all parameters are zero).

When the conditions presented are irrelevant to the respondents, thus when there are no constraining influences, a model with constraints would not perform significantly better than the no constraints (attribute only) model.

Null hypotheses:

1. *Constraints do not play a significant role in the choice decision process.* If this hypothesis is valid, the **composite, all constraints model** (6.10) would not perform significantly better than the **no constraints model** (6.2)
2. *Circumstantial constraints do not play a significant role in the choice decision process.* If this hypothesis is true, the **circumstantial constraints model** (6.9) would not perform significantly better than the **no constraints model** (6.2).
3. *Blocking constraints do not play a significant role in the choice decision process.* If this is true, the **blocking constraints model** (6.9) would not perform significantly better than the **no constraints model** (6.2).

When the respondent group only experiences blocking constraints, a model with both constraint types included would not perform significantly better than the model that only features the condition specific constants.

4. *Of both constraint types, only blocking constraints play a significant role in the choice decision process.* If this would be the case, then **composite, all constraints model** (6.10) would not perform significantly better than the **blocking constraints model** (6.7).

When the respondent group only experiences constraints through the other variables of the model, a model with both constraint types included would not perform significantly better than the model that only features these interactions of conditions and attributes.

5. *Of both constraint types, only circumstantial constraints play a significant role in the choice decision process.* If this would be the case, then **composite, all constraints model** (6.10) would not perform significantly better than the **circumstantial constraints model** (6.9).

Tables 9.6a, b and c show the comparable performance values for the different model specifications of the three market segment data sets. The hypotheses are tested for each segment group.

9.4.1 Hypothesis test for the museum segment

Table 9.6a Model performance comparisons, museum segment

Model	rank	RhoSquare (AIC)	# parameters	AIC
no constraints (6.2)	4	.281	25	6405
blocking constraints only (6.7)	3	.293	32	6293
circumstantial constraints only (6.9)	2	.298	40	6255
all constraints (6.10)	1	.311	47	6141

All null hypotheses are rejected at alpha <.001. That is, the **all constraints, composite model** (6.10) is significantly outperforms all other models for the museum group's data. This indicates that both constraint types are relevant for this segment's decision process.

9.4.2 Hypothesis test for the variety seeking segment

All hypotheses are rejected at alpha <.001. That is, the **all constraints, composite model** (6.10) is significantly outperforms all other model for the museum group's data. This indicates that both constraint types are relevant for this segment's decision process.

Table 9.6b Model performance comparisons, variety seeking segment

Model	rank	RhoSquare (AIC)	# parameters	AIC
no constraints (6.2)	4	.326	28	7020
blocking constraints only (6.7)	2	.379	35	6478
circumstantial constraints only (6.9)	3	.335	47	6928
all constraints (6.10)	1	.383	54	6429

9.4.3 Hypothesis test for the amusement segment

Table 9.6c Model performance comparisons, amusement segment

Model	rank	RhoSquare (AIC)	# parameters	AIC
no constraints (6.2)	4	.337	28	6855
blocking constraints only (6.7)	1	.382	35	6396
circumstantial constraints only (6.9)	3	.381	52	6403
all constraints (6.10)	1	.384	56	6373

All but one hypotheses are rejected at alpha <.001. The **composite, all constraints model** (6.10) significantly outperforms by the **no constraints model** (6.2), and the **circumstantial constraints model** (6.9). However, the **composite, all constraints model** (6.10) does not perform significantly better than the **blocking constraints model** (6.7). This means that the circumstantial constraints can be left out without significant damage to the model's performance.

9.5 Conclusion

This chapter provided an empirical test of the conceptual model presented in chapter 6. The empirical study involved the construction of an empirical design, in which the model's attributes were varied and profiles were allocated to choice sets. The experimental design allowed us to estimate different models, and thus to compare model specifications and to conclude on the relevancy of the constraint types specified. To this end, four different models were specified: *(i)* the no constraints, attributes only model, and as an extension of *(i)*, *(ii)* the blocking constraints only model, *(iii)* the circumstantial constraints model, and *(iv)* the composite, all constraints model, featuring both constraint types. Hypotheses were formulated to test if the latter model was outperformed by any other model. The results of the model tests indicate if the specified constraint types are relevant. In other words, the model test demonstrates whether or not the respondent groups experience the influence of certain constraints.

While the museum visitors experience few blocking constraints, amusement park visitors suffer these to a relatively high degree. All segments undergo influence of blocking constraints, as indicated by the fact that the composite model, with blocking constraints, which outperforms all other models for all three segments. Circumstantial constraints do occur for the museum group and the variety seekers, but can be excluded from the amusement group's choice model without damage to its performance. As a conclusion of the model estimation, we can roughly outline the process of choice behavior for the three target groups. Museum visitors are not often directly constrained to participate in a day trip by the conditions specified in this study. However, the conditions do indeed influence the consumers' evaluations of attributes in the further stages of the decision process. Variety seekers, who prefer both zoos and amusement parks, definitely prefer to commence the trip early in the morning. If this condition is not satisfied, many are inclined not to go. The group of exclusively amusement park enthusiasts experiences more direct constraints from the conditions specified. Either without their children, by late departure, or bad weather conditions, they are inclined to stay home.

10 Simulation of Choices

10.1 Introduction

In the previous chapter the estimation results of the model were discussed and parameter values were interpreted. This chapter is concerned with the implications for car mobility reduction schemes. How can the model results be translated into useful recommendations for the planning and management of leisure mobility? For this purpose, a decision support system using the model estimations was developed. Given the model attributes' part-worth utilities, choice probabilities for any hypothetical alternative, described as a combination of the attributes varied in the experiment, can be calculated.

The multinomial logit (MNL) model (see equation 5.3) assumes that the probability of choosing alternative i in choice set J equals the probability that the alternative's utility U_i is larger than the utility of all other alternatives in the choice set J. The equations for this model are presented in chapter 5 (equations 5.1 through 5.3). Under the assumption that the model's choice set represents the real world choice set, and assuming that the response to the questionnaire has strong internal validity, the choice probabilities can be translated into market shares.

Changes in these market shares reflect the relative impact of certain initiatives, or of combinations of initiatives. Thus, the applied model structure allows one to assess market effects of planning programs under a number of given circumstances.

Decision support systems aid managers and planners in their efforts to develop schemes to realize particular objectives. Strategic decisions can be based upon these results. In the second part of this chapter, principles of decision support systems are discussed. The decision support system presented in this chapter is supposed to support strategic decisions related to certain incentives that affect modal split and overall patronage of a single tourism destination. In the third section, we will elobarate on a number of car mobility reduction strategies. Here, we follow the question whether acts of planning in park managers' domain can yield fruitful results. These local initiatives are compared with initiatives on a more generic level.

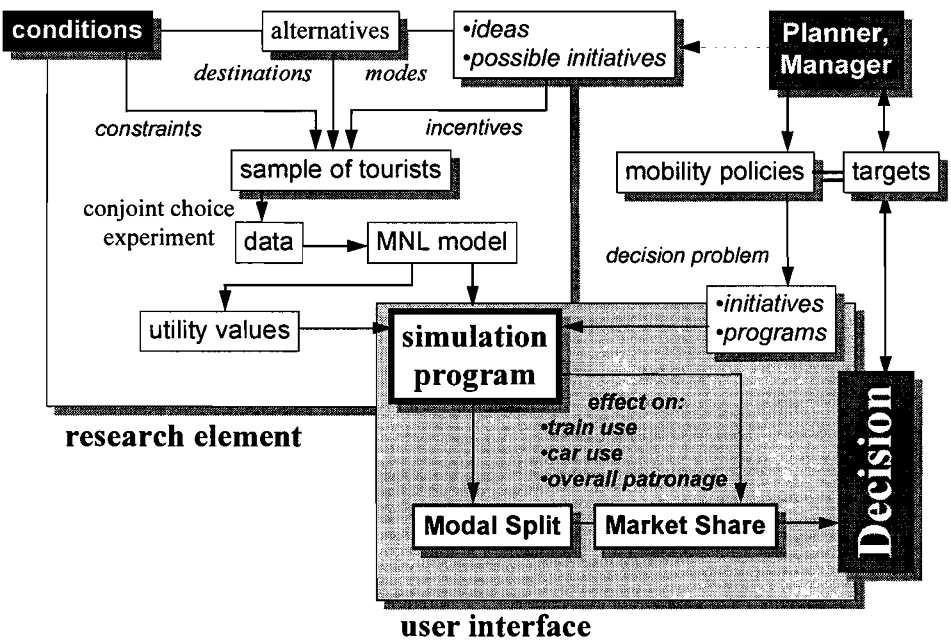
10.2 The decision support system

In chapter 3 we discussed a number of initiatives to reduce car use for leisure. More specifically, it involved an analysis of the planning of car mobility reduction at large scale tourism attractions. For different destination types, different segments of the population with their associated preferences and specific demands and requirements were identified (see chapter 8). In this chapter, choice simulations are performed for each of these segments. The decision support system (DSS) in this study is a computer program that operates as a user interface between the choice model's parameters and the transport planner, park manager or any other relevant planning agent or decision maker. Figure 10.1 shows its basic format. Following the research design, the DSS requires three types of variables as input. First, ideas of planning and management, such as possible initiatives, are used as the planning variables. Planners can thus play an active role in the formulation of the research questions. Secondly, the system requires a description of the attributes of the tourist attractions and the transport modes. Thirdly, condition variables to potentially induce individual constraints should be made explicit and thus known.

10.2.1 Description of the program

A spreadsheet stores the underlying MNL model with its parameter values for the alternatives, attributes (incentives) and condition variables (constraints). The spreadsheet performs all calculations based on the MNL model. Part-worth utility values are calculated for each attribute level. Utility values of choice alternatives are expressed as the sum of all part-worth utilities. Subsequently, equation 5.3 is executed, resulting in the choice probabilities of all options in the choice set. We interpret these choice probabilities as market shares for the choice alternatives concerned.

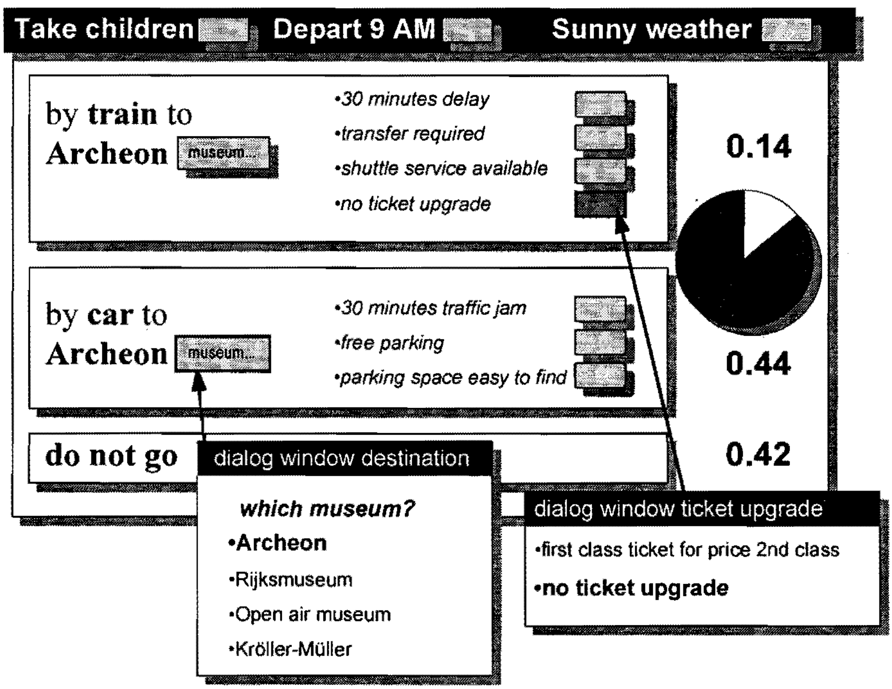
Figure 10.1 Model of the decision support system



A screen sample of the simulation program is shown in Figure 10.2; this is the actual presentation of the user interface of Figure 10.1. The user has formulated some policies and has probably set targets and objectives to be met.

The simulation program allows the user to experiment with these ideas and initiatives. Moreover, the user can select any combination of intiatives to be evaluated, with any combination of conditions. In order to change the attribute levels buttons are used; when pushing a button a dialog box appears with the relevant attribute levels. The market share values change with changing an attribute or a condition variable level. A pie chart further displays these market shares (see Figure 10.2).

Figure 10.2 Example of the decision support system (user interface)



Any possible combination of conditions and attribute levels can be made. Because we are interested in modal split to attraction destinations, we simulate choice situations where the group of consumers can choose between car and train for a single destination. As in the choice sets of the survey, the incentive variables vary for the transport mode options separately, and the conditions are varied for the whole situation. The market share of the base alternative (*do not go*) indicates the non-participation rate. As such, the effects of potential planning acts on the destination's overall patronage are calculated. Plans can, for instance, be successful in terms of modal split, but on the other hand discourage tourists to visit a particular park. Park managers will aim at finding the balance between car reduction and overall patronage, and thus to keep the base alternative's market share as low as possible.

The prospected user works through a trial and error strategy to achieve the ideal situation, i.e., the most fruitful combination of initiatives, under realistic conditions. Effects for sunny and rainy days can be observed separately, as well as for early and late departure (and subsequent arrival) of the site's visitors. Also, the effect of bringing children can be measured. It must be noted that this DSS considers costs and benefits of initiatives in terms of modal split and patronage. It does not involve a consideration of financial costs and benefits. This would require more information, and thus involves an additional consideration of the DSS user.

10.2.2 Disclaimer

A number of assumptions for these simulated mode choices must be made. An important assumption is that the market for each choice alternative is represented by the respondents from the stated choice experiment. The focus of the study was on testing the modeling approach, not on obtaining a representative sample. Shortcomings to the sampling method applied and the assumptions of the stated choice model were reported in chapter 9. To summarize, a number of warnings to this decision support system should be given, and be taken into account while interpreting the simulation results:

- The respondents to the survey do not necessarily form the market for the tourism attraction involved. In other words, the reliability of the decision support system depends on whether the respondents represent the site's market or market potential.
- The model's internal validity rates reasonable to good, but people will not always behave as in the experiment. Some information that was given in the experiment, is often not available in reality, where information constraints may still play a role.

- The MNL model results in choice probabilities $p(a|A)$, for the aggregate sample. These choice probabilities are interpreted as market shares for the alternatives considered. It must however be noted that we did not make any differentiations within the sample. We can therefore not describe the market shares.

10.3 Museum segment choices

The choice set for the museum segment consists of four museums. The four attraction sites differ in terms of site layout and composition, geographical situation, and accessibility. Table 10.1 shows travel times to these museums from a number of major cities in the country.

Table 10.1 Travel times by train to the four museums from some major cities

	Archeon	*Open air museum*	*Rijksmuseum*	*Kröller-Müller*
station	*Alphen aan de Rijn*	*Amhem*	*Amsterdam Central Station*	*Ede-Wageningen or Apeldoom*
Amsterdam	0.55	1.10	0	0.55
Rotterdam	0.50	1.20	1.05	1.05
Den Haag	0.35	1.20	0.55	1.05
Utrecht	0.25	0.40	0.30	0.25
Nijmegen	1.50	0.15	1.30	0.30
Enschede	2.35	1.15	2.05	0.35
Groningen	2.50	2.00	2.15	1.40
Maastricht	2.35	2.30	2.30	2.35
Eindhoven	1.30	1.15	1.25	1.30
Vlissingen	2.35	2.45	2.40	2.45

The *Rijksmuseum* is located in the highly urban center of Amsterdam, whereas *Kröller-Müller* is situated in the middle of a national park. Both the *Rijksmuseum* and *Kröller-Müller* are high profile art museums, while the other two, *Archeon* and the *Open air museum*, can be regarded as historical theme parks. The latter two are primarily parks in the open air, the *Rijksmuseum* is completely indoors, and *Kröller-Müller* has its attractions both indoors and outdoors. For the simulation of choices, we have first delineated a realistic situation. The market shares show the impact of changes in the attribute values.

10.3.1 Archeon

The archaeological theme park *Archeon* is a relatively new (opened 1994), mainly outdoors museum 'where in one day you experience prehistoric, Roman, and middle ages' (*Er op uit!*, 1995). Actors play a major role in this historic experience: they perform a wide variety of ancient daily life activities. *Archeon* is open from april to october, the entrance fee is NLG 15.50 for young children, and NLG 22.50 for persons over 12 years of age. The park is situated in the town of Alphen aan de Rijn, right in the center of Randstad Holland. The four major cities of the Netherlands, Amsterdam, Rotterdam, The Hague and Utrecht, are all within a half our's drive. A special shuttle service runs between Alphen train station and the park entrance. The park has been subject of a mobility demonstration project (see chapter 3, section 3.4). Table 10.2 gives a specification of the initial mobility situation. The park is entertaining as well as educational, so people would take their children on the trip. The size of the park would require an early departure. Being located in the heart of Randstad Holland, traffic jams are possible at any incoming route. Train delays can also appear at any time. Only from Utrecht and Leiden there are direct connections to Alphen aan de Rijn train station, so one or more transfers should be taken into account. *Archeon* offers free parking on a large car park near the entrance. *Archeon* is a public transport friendly park, but does not decourage car use.

The initial modal split shows that the number of train travelers to car drivers is equal to 1 : 3.1. Of the museum segment, 42 per cent would rather choose not to go to any of the two alternatives. If one would manage to secure a train connection without any delays (see Table 10.2), *Archeon* would win 3 percent new visitors. A further 2 per cent would choose train instead of car. The modal split has changed into (train : car) 1: 2.2. Taking transfers out of the train trip does not make any difference in comparison with the initial situation (Appendix C.1 shows that there is no significant parameter value for this attribute). The introduction of free extra luxury on the train trip however does enhance the attractiveness of train traveling, as compared with the initial situation. With a free ticket upgrade one can travel first class for the price of a second class ticket (normally, 50 per cent more expensive). *Archeon* would increase its figures by 2 percent, and another 1 percent would shift from car to train. So, two direct initiatives are relevant to be combined for the train alternative: taking away the delay and the introduction of free ticket upgrades. In comparison with the initial situation, it results in 3 percent predicted new visitors to the park, and a 6 percent shift from car to train. The modal split is (train : car) 1 : 1.7.

Table 10.2 *Archeon*, initial modal split and modal split after interventions

Take children Departure 9 AM Sunny weather	*30 minutes delay* *transfer required* *shuttle service available* *no ticket upgrade*	*30 minutes traffic jam* *free parking* *parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	14	44	42
take away delay	19	42	39
direct connection	14	44	42
free ticket upgrade	17	43	40
combine relevant train incentives	**23**	**40**	**37**
train incentives and parking fee	28	27	45
train incentives and reduce parking space	28	27	45
combine train and parking incentives	**31**	**18**	**51**
park management incentives	24	20	57

Naturally, the modal split can also be influenced as well by initiatives that, rather than stimulate train use, are meant to discourage car use. When paid parking is introduced, in addition to the two train stimulating initiatives, the results are fascinating. The price of two guilders per hour is by no means expensive (in comparison, the entrance fee is over 20 guilders). In comparison with the situation of combined train initiatives, its result is however rather drastic: the train alternative increases from 0.23 to 0.28, while car use drops from 40 to 27 percent. The park would loose 8 percent visitors. However, compared with the initial situation, the park looses only 3 percent. In other words, the combination of all three incentives would cost the park 3 percent patronage, but would change the modal split from (train : car) 1 : 3 into 1 : 1. Reducing the available parking space causes car drivers more effort to find a parking space. Its effect equals that of the parking fee initiative. Combining the latter two parking incentives results in a (train : car) 1.7 : 1 modal split. Archeon looses 6 percent visitors, as compared to the situation with only one parking incentive. In comparison with the present situation the park's loss is 9 percent. The parking incentives result in a modal shift from car to train. In other words, these initiatives did work for part of the segment, but for a larger part it resulted in non-participation. Being a public transport friendly destination, *Archeon* already has a relatively favorable modal split. The only possible initiatives to be taken directly by park management are a free ticket upgrade, the reduction of parking and the introduction of a parking fee. As a result, the car's market share, as predicted by the model, would decrease with 24 percent, 10 of which would shift to the train option (the initial situation is the base for comparison here). Its results would not favor the park's revenues: it would loose 15 percent potential visitors.

10.3.2 The Open air museum

Het Nederlands Openluchtmuseum is like *Archeon,* mainly an outdoors historical theme park: it is both entertaining and educational. The park itself is considerably older than *Archeon*, but its historical elements are more recent: 18th and 19th century daily life is portrayed by buildings, furniture, tools and instruments. Entrance fee is NLG 11 for children under 12 and NLG 18.50 for others. The park is open from April to October. It is situated on the northern edge of the city of Arnhem; there is a scheduled transit service between Arnhem train station and the park entrance. Buses run every 15 minutes to the *Open air museum,* the route takes approximately 20 minutes. A shuttle service is available for train travelers at 10 guilders per person (*train-taxis* normally charge 6 guilders).

For the initial mobility situation (see Table 10.3), we should take into account that traffic jams and train delays are likely to occur. The *Open air museum* has ample free parking space. People would take their children, and could be entertained for a full day; they would therefore leave early. The stated modal split for this present situation is (train : car) 1: 5. Taking away the train delay would *ceteris paribus* yield 4 percent new visitors. Another 4 percent would change their mode choice behavior. The modal split changes into (train : car) 1 : 2.6. Taking out the transfers required for the train trip gives an extra 3 percent to the train's market share. The park gains just one percent new visitors; one other percent changes its mode choice. As a result, the modal split is (train : car) 1: 3.8. The introduction of a free ticket upgrade yields more: 2 percent new visitors, and a two percent modal shift away from the car to the train option. It results in a modal split (train : car) of 1 : 3.3. Combining the three train incentives would result in 10 percent new visitors. 13 percent of the segment would change their mode choices from car to train. Where the initial modal split was 1 train traveler on every 5 car travelers, here there is a train traveler for 1.2 car travelers.

Table 10.3 *Open air museum*, initial modal split and modal split after interventions

Take children Departure 9 AM Sunny weather	*30 minutes delay transfer required shuttle service available no ticket upgrade*	*30 minutes traffic jam free parking parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	10	51	39
take away delay	18	47	35
direct connection	13	50	38
free ticket upgrade	15	49	37
combine relevant train incentives	**33**	**38**	**29**
train incentives and parking fee	40	26	35
train incentives and reduce parking space	40	25	35
combine train and parking incentives	**45**	**16**	**39**
park management incentives	22	23	56

In combination with a parking fee, these three train incentives would still yield 4 percent more travelers (in comparison with the initial situation). Faced with this discouraging action, the car's market share would be reduced from 38 to 26 percent. In comparison with the all train incentives situation, of this 12 percent loss 7 would shift to the train option, the other 6 percent will not go to the *Open air museum*. The resulting modal split (train : car) is 1.5 : 1. Reducing the parking lot has the same result as the introduction of parking fees. Maximum train use can be accomplished by combining parking incentives with all train incentives. As compared with the initial situation, there is no overall loss of visitors. The modal split has turned around from (train : car) 1 : 5.1 to 2.8 :1. When we look at those initiatives, however that can be specifically taken by the park management, the result is rather less optimistic. With a reduction of parking space and parking fee imposed, in combination with a train trip that could be delayed and requires changes; the *Open air museum* would loose 17 percent of its visitors. In other words, a successful mobility plan would require generic initiatives and some form of co-operation or partnership with the railway company.

10.3.3 The Rijksmuseum

The *Rijksmuseum* in Amsterdam is a completely indoors museum located in the center of Amsterdam. It is a high profile museum, featuring classical art (mainly 17th century paintings from the Dutch Masters). The museum is open year round. Its location is in the heart of the capital's transit system, and thus very well accessible by public transport. However, the nearest train station is located at a considerable walking distance. Tram and bus services run frequently from the Central Station to the *Rijksmuseum*. Amsterdam has no traintaxi service; a normal taxi fare would be approximately 15 guilders. *NS*, the railway company, offers a combined train-shuttle-entrance day-trip with a tour boat from the Central Station (for 21 guilders per person, including museum fee). This situation, however, can not be estimated. The parking situation in Amsterdam is such that parking space is scarce, and expensive: some 5 guilders per hour. In order to maintain a consistent base for comparison, we specified the parking fee as the relatively cheap 2 guilders per hour (the same as for all the other destinations). A typical museum trip would be made on a rainy day, without children (see Table 10.4a). Under this situation 77 percent of the potential visitors would choose not to go. The initial modal split is very much in favor of the train alternative: for every 10 car travelers there are 13 train travelers.

By taking away the train delays, the *Rijksmuseum* would win 4 percent new visitors. This initiative does not affect the car's market share; all new visitors travel by train. The effect of making direct train connections to Amsterdam Central Station is the same as to Alphen aan de Rijn (for *Archeon*): none. The figures show that the introduction of a shuttle service that runs directly from the Central Station to the museum again results in new visitors, without affecting the car's market share. The introduction of a free ticket upgrade has a similar effect on the modal split: no change for the car's market share, and new visitors travel by train. The conclusion regarding all these three incentives is therefore only a very small effect on car mobility. There is however an important increase in patronage for the *Rijksmuseum*.

Table 10.4a *Rijksmuseum*, initial modal split and modal split after interventions

No children Departure 9 AM Bad weather	*30 minutes delay* *transfer required* *no shuttle service* *no ticket upgrade*	*30 minutes traffic jam* *parking NLG 2 per hour* *parking space hard to find*	
	Market	**shares**	
	Train	**Car**	**do not go**
initial situation	13	10	77
take away delay	18	10	73
direct connection	13	10	77
shuttle service available	16	10	75
free ticket upgrade	15	10	75
combine relevant train incentives	**25**	**9**	**66**
train incentives and free parking	24	13	63
train incentives and expand parking space	23	17	61
combine train and parking incentives	**21**	**23**	**56**

An introduction of free parking for all visitors to the *Rijksmuseum* is very unlikely to happen. The simulation model shows that it would have little effect anyway: only 3 percent newcomers would visit the museum. More effect is to be expected from the expansion of parking space in the vicinity of the museum. The car option would win 7 percent travelers, 5 of which are newcomers and 2 of which make the shift from train to car. Again, such an action is unlikely to happen.

The combination of both parking incentives would cause the car option to have a larger market share than the train alternative. The train does not loose many travelers, so the car alternative wins mainly newcomers.

Table 10.4b *Rijksmuseum*, initial modal split and modal split after interventions, with children

Take children Departure 9 AM Bad weather	*30 minutes delay* *transfer required* *shuttle service available* *no ticket upgrade*	*30 minutes traffic jam* *free parking* *parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	9	7	84
combine relevant train incentives	**25**	**7**	**67**

Table 10.4b compares the initial situation with the situation after the three train incentives, but now with children in the travel party. Results are similar to the situations without children: the market share of the car alternative is not affected. However, in situations with children train incentives have a stronger effect: where the *do not go* option decreases from 77 to 66 percent without children, it decreases from 84 to 67 with children in the travel party.

Table 10.4c *Rijksmuseum*, initial modal split and modal split after interventions, with late departure

No children Departure Noon Bad weather	*30 minutes delay* *transfer required* *shuttle service available* *no ticket upgrade*	*30 minutes traffic jam* *free parking* *parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	5	2	93
combine relevant train incentives	**10**	**4**	**86**

Table 10.4c shows the influence of the train incentives for half-day-trips. A trip to the *Rijksmuseum* that begins at noon is not very popular: 93 percent of the segment would not go. The combined three train incentives would yield a 7 percent increase in the number of visitors.

Table 10.4d ***Rijksmuseum*****, initial modal split and modal split after interventions, sunny weather**

No children Departure 9 AM Sunny weather	*30 minutes delay transfer required shuttle service available no ticket upgrade*	*30 minutes traffic jam free parking parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	17	11	73
combine relevant train incentives	**22**	**10**	**68**

Although Appendix C.1 shows a strong negative value for the interaction of sunny weather with the *Rijksmuseum*, the initial situation as delineated in Table 10.4d shows that more visitors would be attracted to this choice situation. First of all, there is a direct effect of sunny weather that compensates for the interaction with the specific destination. Moreover, there is a negative interaction of sunny weather with shuttle service, which positively affects the alternative without shuttle service. The latter is also one of the reasons for the disappointing result of all three train incentives combined: only 5 percent new visitors on sunny days.

10.3.4 Museum Kröller-Müller

The *Kröller-Müller* museum is a high profile modern art museum that features 20th century paintings, architecture and statues. It is one of the most important modern art museums in the world. The museum is situated in the middle of National Park *the Hoge Veluwe*. Also in this park, at a short distance from the *Kröller-Müller* museum, lies the geological museum *Museonder*. All attractions within the national park are open year round. Its accessibility by public transport is rather problematic: to reach the museum and park it takes a 30 minute public bus journey from either Apeldoorn or Ede-Wageningen. Buses run twice per hour. Entrance fees are NLG 7 / NLG 13.50, including bus fare, and entrance fees for park and both museums. The modern art museum is not specifically appropriate for children, but there are more attractions to this day-trip.

Therefore, we specified a twofold initial situation (see Tables 10.5a and 10.5b), and simulated the influence of planning acts under these two different circumstances: with and without children in the travel party. Delays and traffic jams may occur, transfers are required and there is no shuttle service. Parking in the *Hoge Veluwe* is easy and free. The trip begins early and on a sunny day. A notable difference between both initial situations is the larger market share for the car alternative with children. Market shares for public transport are similar in both situations. Modal splits (train : car) are respectively 1 : 5.7 (with children) and 1 : 5.4 (without children).

Table 10.5a *Kröller-Müller*, initial modal split and modal split after interventions, without children

No children Departure 9 AM Sunny weather	*30 minutes delay transfer required no shuttle service no ticket upgrade*	*30 minutes traffic jam free parking parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	6	34	60
take away delay	14	31	55
direct connection	6	34	60
shuttle service available	10	32	58
free ticket upgrade	6	34	60
combine relevant train incentives	**22**	**28**	**50**
train incentives and parking fee	25	18	57
train incentives and reduce parking space	25	18	57
combine train and parking incentives	**27**	**11**	**62**
park management incentives	13	13	74

Taking away the delay would double the train's market share. Two thirds of the new train travelers are newcomers, the rest changes their mode choice behavior from car into train. The modal splits have changed into (train : car) 1 : 2.2 (no children) respectively 1 : 2.3. As in the cases of *Archeon* and the *Rijksmuseum*, making a direct train connection has no influence at all on modal split or visitor figures. The introduction of a shuttle service from the nearest train stations has a moderate influence on mode choice and participation. The train's market share increases by 4 percent, half are newcomers, half make the modal shift. Modal splits are (train : car) 1: 3.2 and 1 : 3.3. Introduction of a free ticket upgrade has no influence for this destination. The free ticket upgrade does not apply for the bus trip, which comprises a relatively large part of the whole trip here. The two relevant train incentives combined yield 10 percent newcomers to the museum. Some 6 percent make the shift from car to train, which results in a modal split (train : car) of 1 : 1.3 for both situations.

Imposing a parking fee on incoming cars gives a direct loss of 7 percent visitors. The train options win 3 to 4 percent, the car alternative looses 10 to 11. Reducing the amount of parking space has a similar effect. As a result , the modal split would be 1.4 train travelers to a car traveler for both situations. Combining all train and parking incentives would result in a predicted loss of 12 percent visitors for *Kröller-Müller*.

Not being able to interfere in the railway company's policies, three relevant initiatives could be taken by the park management. These would however affect the park's visitor figures negatively. The introduction of a shuttle service alone yields only 2 percent extra visitors, which is probably insufficient to cover the cost of such a facility. Therefore, generic incentives, involving the train system as a whole, are required to enhance the parks' modal split significantly.

Table 10.5b *Kröller-Müller*, initial modal split and modal split after interventions, with children

Take children Departure 9 AM Sunny weather	*30 minutes delay transfer required no shuttle service no ticket upgrade*	*30 minutes traffic jam free parking parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	7	38	56
take away delay	15	34	50
direct connection	7	38	56
shuttle service available	11	36	53
free ticket upgrade	7	38	56
combine relevant train incentives	**24**	**31**	**45**
train incentives and parking fee	28	20	52
train incentives and reduce parking space	28	20	52
combine train and parking incentives	**30**	**12**	**57**
park management incentives	15	15	70

10.4 Variety segment choices

The choice set for the variety segment consists of two zoos and two amusement parks. Table 10.6 shows travel times to the sites from a number of major cities in the country.

The *Efteling* is by far the most popular theme park in the Netherlands (see also Figure 3.1). Second is the *Noorder* zoo, in the north of the country. *Burgers'* zoo is situated adjacent the *Open air museum* in Arnhem. *Walibi Flevo* is a new amusement park (opened 1994) in the Flevopolder. There is an older *Walibi* amusement park in Belgium. For the simulation of choices, we have first delineated a realistic situation. The market shares show the impact of changes in the attribute values.

Table 10.6 Travel times by train to the four museums from some major cities

	Efteling	*Noorder zoo*	*Burgers' zoo*	*Walibi Flevo*
station	*Tilburg or Den Bosch*	*Emmen*	*Arnhem*	*Harderwijk*
Amsterdam	1.00	2.15	1.00	1.05
Rotterdam	0.45	2.40	1.20	1.35
Den Haag	1.15	2.40	1.20	1.15
Utrecht	0.30	1.55	0.40	0.30
Nijmegen	0.30	2.20	0.15	1.50
Enschede	2.00	1.40	1.15	1.50
Groningen	2.45	1.55	2.00	1.30
Maastricht	1.30	4.20	2.30	3.10
Eindhoven	0.20	2.45	1.15	1.25
Vlissingen	1.35	4.15	2.45	3.15

10.4.1 The Efteling

The most popular attraction site in the Netherlands features a fairy tale forest for young children, as well as attractions for adults such as a spectacular roller coaster. The park is open from april to october; admission fee is NLG 33 per person. It is accessible by public transport buses from both Den Bosch and Tilburg stations, buses depart every 30 minutes; the trip takes between 20 and 30 minutes.

There is plenty free car parking space, but a trip to the *Efteling* cannot be guaranteed free of congestion. Hence, the initial situation for the car alternative is shown in Table 10.7a. For the train option, we specified the possibility of delay and transfer, there is no shuttle service and no ticket upgrade. This situation results in a modal split of (train : car) 1 : 10.4. Note that in this section we only simulate the variety seeking segment of *Efteling* visitors; in 10.5.1 (Table 10.12) we simulate for the amusement segment. The variety segment does not place the Efteling on top in its ranking table: it ranks third, behind both zoos.

Table 10.7a *Efteling*, initial modal split and modal split after interventions, with children

Take children Departure 9 AM Sunny weather	*30 minutes delay transfer required no shuttle service no ticket upgrade*	*30 minutes traffic jam free parking parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	7	73	20
take away delay	26	58	16
direct connection	11	70	19
shuttle service available	11	70	19
free ticket upgrade	7	73	20
combine relevant train incentives	**45**	**43**	**12**
train incentives and parking fee	54	31	15
train incentives and reduce parking space	50	36	14
combine train and parking incentives	**59**	**25**	**16**
..........+ no traffic jam	50	36	14
park management: both parking incentives	18	50	32
park management: only parking fee	16	57	27
park management: parking availability	14	63	24

The first initiative we simulate is to take away the train delay. It has a spectacular predicted impact on mode choice: 15 percent makes the shift from car to train. Moreover, the *Efteling* (and the train alternative) wins 4 percent new visitors. Note that the no delay parameter (see Appendix C.2) is high, and moreover, the interaction with early departure is significant and substantial. Caused by this incentive, the modal split changes into (train : car) 1: 2.2. Taking away every possible transfer from the train trip does not affect the modal split so vigorously. The Efteling wins 1 percent, while 3 percent of the respondents change their mode choice behavior. As a result, the modal split (train : car) will change to 1 : 6.4. The same effect can be expected from the introduction of shuttle services from Den Bosch and Tilburg train stations. That effect is remarkably low, because the public buses do not run a frequent and fast service to the park entrance. A shuttle service would thus significantly enhance a train journey's comfort. No significant parameter was found for free ticket upgrade (see Appendix C.2). Therefore, the introduction of such an upgrade does not significantly influence the alternatives' market shares. The three relevant incentives combined yield an 8 percent win for the *Efteling*. Moreover, 30 percent would make the shift from car to train, resulting in equal proportions for both transport modes.

Imposing a parking fee does increase the train's market share even further by 9 percent. As a result, the modal split now changes into 1.7 train travelers for each car driver. The *Efteling* as a whole looses a mere 3 percent, but in comparison with the initial situation still wins 5 percent. Having more trouble finding parking space is less reason for a modal shift. The market share of car decreases by 7 percent; 5 percent makes the modal shift, 2 percent decides not to go at all. Combining the train incentives and two parking incentives yields a loss of 4 percent visitors, in comparison with the train incentives alone. That is, however, still 4 percent above the initial situation. The modal split is very much in favor of the train alternative: one every car driver, 2.4 people travel by train.

The figures demonstrate that the outlook of a traffic jam has a large predicted influence on choices: in comparison with the latter situation, the car alternative would win back 11 percent, of which 9 at the cost of the train option. The variables to be directly influenced by the park's management are rather limited. It is possible to improve the modal split, but only at the cost of a decrease in the number of visitors. Appendix C.2 shows that late departure operates as a strong blocking constraint. That means that participation in a trip to the *Efteling* falls dramatically with a late departure. Table 10.7b confirms this notion with a high market share of the base alternative. Initiatives such as taking away the train delay could however still be relevant after the early peak hours. Still 9 percent of the late risers can be won, and that the train's market share can be increased fourfold.

Table 10.7b *Efteling*, initial modal split and modal split after interventions, late departure

Take children Departure Noo Sunny weather	*30 minutes delay* *transfer required* *no shuttle service* *no ticket upgrade*	*30 minutes traffic jam* *free parking* *parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	4	25	71
combine relevant train incentives	**16**	**22**	**62**

10.4.2 Noorder zoo

The admission fees of the second most popular attraction destination in the Netherlands, are 14 (under 12 years) and 18 guilders; the zoo is open year round. It is situated in the far Northeast of the country, where traffic jams are rare. Hence, the specification of the initial car alternative without congestion (see Table 10.8a). Ample free parking space is available. The zoo's entrance is 10 minutes walking from Emmen station, there is no bus service, nor a shuttle service. Train delays to the north could still occur. People would normally go on a sunny day, take their children, and depart early. This initial situation has a high participation rate: only 11 percent of the respondents does not go. The modal split is extremely unfavorable for the train option: for each train traveler, more than 20 visitors would drive.

Taking away the train delay would more than double the train's market share. Most of the new train travelers would shift from the car option. The modal split changes into one train traveler for every 9 car drivers. Taking out the transfers required for the train trip causes a small modal shift, and no new visitors. The introduction of a shuttle service for the 10 minutes walk from Emmen station has indeed a small influence. A mere 1 percent new visitors to *Noorder* zoo is attracted by this incentive. A similar effect is to be expected from a free upgrade of the second class train ticket. At first sight, all three incentives of taking away the transfers, the introduction of a shuttle service and a free ticket upgrade have a similar effect on mode and destination choice. Appendix C.2, however, shows that these influences can differ, depending on the circumstances. The parameter value for direct connection at the *Noorder* zoo is 0.19, for shuttle service this is 0.14, and for free ticket upgrade 0.10. A direct connection has no significant interactions. Shuttle service interacts here with taking children (0.10), and free ticket upgrade with early departure (0.12). All four train incentives being relevant, their combined predicted effect yields 3 percent new visitors to the Noorder zoo. There is a spectacular modal shift of 21 percent from car to train. However, the modal split is still (train : car) 1: 2.3.

With the imposition of a parking fee, together with the four train incentives, the train option wins 10 percent. *Noorder* zoo would loose 3 percent attendance, but this figure is not worse than the initial situation. The resulting modal split is (train : car) 1 : 1.3. The reduction of car parking space has a similar effect, resulting in a modal split of 1.4 car drivers for each train traveler. All incentives combined *Noorder zoo* looses 3 percent compared with the initial situation. The modal split now is in favor of the train alternative: for every car driver, there is an average of 1.2 train travelers.

Table 10.8a *Noorder zoo*, initial modal split and modal split after interventions

Take children Departure 9 AM Sunny weather	*30 minutes delay* *transfer required* *no shuttle service* *no ticket upgrade*	*no traffic jam* *free parking* *parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	4	85	11
take away delay	9	80	10
direct connection	6	84	11
shuttle service available	6	83	10
free ticket upgrade	6	83	10
combine relevant train incentives	**28**	**64**	**8**
train incentives and parking fee	38	51	11
train incentives and reduce parking space	37	52	11
combine train and parking incentives	**48**	**39**	**14**
..........+ with 30 minutes traffic jam	58	25	17

The table demonstrates that *Noorder* zoo profits from its situation in the not so densely populated Northeast: with a higher possibility of traffic jams, its attendance would decrease three percent. For the train option, however, this is a disadvantage: with possible traffic jams on the car trip, its market share could be 10 percent higher. One could, therefore, argue that traffic jams are in favor of the environment.

Table 10.8b *Noorder zoo*, initial modal split and modal split after interventions, with late departure

Take children Departure Noon Sunny weather	*30 minutes delay* *transfer required* *no shuttle service* *no ticket upgrade*	*no traffic jam* *free parking* *parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	2	42	56
combine relevant train incentives	**13**	**37**	**50**
combine train and parking incentives	**17**	**17**	**66**

Table 10.8b shows that late departure has a strong negative effect on the participation rate of this segment. Train incentives could however still significantly increase the zoo's attendance. The parking incentives have a strong negative effect on participation.

10.4.3 Burgers' zoo

For this segment, Burgers' zoo is the most popular attraction destination (see Appendix C.2), but in reality it ranks third, behind the *Efteling* and *Noorder* zoo (see Figure 3.1). This zoo features an indoors desert and tropical rainforest as well as a safari train. The admission fees are 17 (under 12 years) and 23 guilders per person. *Burgers' zoo* is located on the northern edge of Arnhem, adjacent to the *Open air museum.* City buses run every quarter hour to the park's entrance from Arnhem train station, taking 17 minutes, and a shuttle service is available. We specified the initial situation as presented in Table 10.9. The accessibility of

Burgers' is similar to that of the *Open air* museum, allowing us to compare the two. Table 10.9 shows that the modal split of the *Open air* museum is relatively more in favor of the train option: on every 5 car drivers there is a train traveler, whereas *Burgers'* has one in 7. It suggests that the museum segment has a different preference structure.

Table 10.9 *Burgers' zoo*, initial modal split and modal split after interventions

Take children Departure 9 AM Sunny weather	*30 minutes delay transfer required shuttle service available no ticket upgrade*	*30 minutes traffic jam free parking parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	10	72	18
take away delay	22	62	16
direct connection	13	69	18
free ticket upgrade	13	69	18
combine relevant train incentives	**37**	**50**	**13**
train incentives and parking fee	45	39	16
train incentives and reduce parking space	46	39	16
combine train and parking incentives	**53**	**29**	**18**
park management incentives	23	47	30

Taking away the delay of trains has a great effect on the modal split: 10 percent of the car drivers make the modal shift, resulting in only 2.8 car drivers on each train traveler. The effect on overall participation, however, is small: only 2 percent new visitors. Taking out the transfers that were required for the train trip gives no increase in visitors. 3 Percent change their mode choice behavior. The introduction of a free ticket upgrade is of a similar effect. The resulting modal split (train : car) is 1 : 5.3. All three incentives combined, its net effect is 5 percent new visitors, and the modal split changed into (train : car) 1: 1.4. The modal shift from car to train is 22 percent. In comparison: the modal shift for the adjacent *Open air museum* was 27 percent, with 10 percent new visitors.

The introduction of a parking fee would result in a loss of 3 percent visitors, which still amounts to 2 percent more compared to the initial situation. A similar effect is obtained for reducing the overall space for parking. With both parking and train incentives combined *Burgers' zoo* would not loose any visitors. The modal split would be sucessfully altered into 1.8 train travelers on each car driver. These incentives had a similar effect on the attendance for the *Open air museum* (see Table 10.3): no change, but an important modal shift.

However, when we look at those initiatives that can be specifically taken by the park management, the result is less optimistic. With a reduction of parking space and the introduction of a parking fee, in combination with a possibly delayed train trip that also requires changes, *Burgers'* zoo is predicted to loose 12 percent of its visitors. In other words, a successful mobility plan requires generic initiatives in co-operation with the railway company.

10.4.4 Walibi Flevo

Walibi Flevo only recently opened (1994) in the Netherlands. Its name is, however, not unfamiliar to the public; in Belgium there has been a Walibi amusement park for a longer time. Walibi is by far the least popular attraction destination for this variety segment. The admission for *Walibi Flevo* is NLG 28, from April to October. The train station nearest *Walibi Flevo* is Harderwijk to the South, from where public transport buses run every hour. To date, no bus services have been running from the station to the West of *Walibi Flevo*, Lelystad, which makes the train trip quite disadvantageous from the direction of Amsterdam.

While the trip by car from Amsterdam can be made easily in half an hour, it takes more than a full hour to reach Harderwijk by train, and an additional 30 minutes by bus. Being located centrally in the country, traffic jams and delays are likely to occur. Ample free parking space is available; there is no shuttle service. The initial situation yields a participation of 74 percent, with a modal split (train : car) of 1 : 8.3 (see Table 10.10a).

Removing delays from the trip doubles the train's market share, and yields 3 percent more visitors. The resulting modal split is (train : car) 1 : 3.5. Direct connection (see Appendix C.2) has no significant parameter, nor any of its interactions. Therefore, there is no effect for this incentive. In spite of the not very favorable train accessibility, a shuttle service would not enhance the train's market share very much.

Table 10.10a *Walibi Flevo*, initial modal split and modal split after interventions

Take children Departure 9 AM Sunny weather	*30 minutes delay transfer required no shuttle service no ticket upgrade*	*30 minutes traffic jam free parking parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	8	66	26
take away delay	17	60	23
direct connection	8	66	26
shuttle service available	11	64	25
free ticket upgrade	11	64	25
combine relevant train incentives	**28**	**52**	**20**
train incentives and parking fee	35	40	25
train incentives and reduce parking space	36	39	26
combine train and parking incentives	**42**	**28**	**30**

We did not specify a shuttle service explicitly from Lelystad (direction of Amsterdam) for this case, which would perhaps have given better results. Ticket upgrade yields attendance and modal split results similar to that obtained for a the shuttle service. On every train traveler we see 5.8 car drivers. A combination of all relevant train incentives would generate 6 percent new travelers, and a modal shift of 14 percent. The resulting modal split (train : car) is 1 : 1.9.

Table 10.10b *Walibi Flevo*, initial modal split and modal split after interventions, without children

No children Departure 9 AM Sunny weather	*30 minutes delay transfer required no shuttle service no ticket upgrade*	*30 minutes traffic jam free parking parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	7	37	56
combine relevant train incentives	**24**	**30**	**46**
combine train and parking incentives	**30**	**13**	**57**

In combination with all train incentives, either a parking fee or a reduction of car parking space could be imposed without loss of visitors. The combination of both parking incentives would result in a 4 percent loss of visitors. Appendix C.2 shows that the destination *Walibi Flevo* as such positively interacts with taking children, and with the car mode. In other words, the trip with children would be favorable for Walibi's visitor figures. Remind that not taking the children has a blocking effect of -.12 for the variety segment's choices as a whole. Table 10.10b shows the simulation for situations without children. In comparison with Table 10.10a we indeed see that the car option suffers from not bringing the children, but that there is little difference for the train option.

Table 10.11 Travel times by train to the amusement parks from some major cities

	Efteling	***Adventure park Hellendoorn***	***Duinrell Wassenaar***	***Walibi Flevo***
station	*Tilburg or Den Bosch*	*Nijverdal or Almelo*	*Den Haag CS*	*Harderwijk*
Amsterdam	1.00	1.55	0.55	1.05
Rotterdam	0.45	2.20	0.25	1.35
Den Haag	1.15	2.20	0	1.15
Utrecht	0.30	1.35	0.40	0.30
Nijmegen	0.30	1.40	1.40	1.50
Enschede	2.00	0.35	2.30	1.50
Groningen	2.45	1.40	2.40	1.30
Maastricht	1.30	4.05	2.50	3.10
Eindhoven	0.20	2.50	1.40	1.25
Vlissingen	1.35	3.55	2.15	3.15

10.5 Amusement segment choices

Two of the four destinations we specified for the amusement segment, did also occur in the variety segment. Both segments' choice sets feature the *Efteling* and *Walibi Flevo*. It gives the opportunity to compare for both segments the evaluation of the accessibility situation and the impact of mobility incentives. *Duinrell* in Wassenaar is located in the congested and densely populated Randstad Holland;

Hellendoorn on the other hand is located in the more quiet East of the country (see Figure 10.5). Table 10.3 shows a number of one way travel times by train to these sites.

10.5.1 The Efteling

The *Efteling* is by far the most visited attraction site in the Netherlands, and is also by far the most popular destination for the amusement segment (see Appendix C.3). Hence the initial situation for the choice set is similar to Table 10.12 (see also Table 10.7a). This situation results for the variety segment in a modal split of (train : car) 1 : 10.4. This segment has 1 : 9.8. Taking away delays does not bring many new visitors to the *Efteling*, but does cause an important modal shift of 6 percent. Modal split now is (train : car) 1 : 5.1. This same incentive has a much greater impact on the variety segment, where a modal shift of 15 percent is accomplished. The effect of a direct train connection to the Efteling is similar for both the amusement and the variety segment: the Efteling wins 1 percent, and 3 percent shift from car to train. The modal split is (train : car) 1 : 7.5. The shuttle service has the same limited effect as the direct train connection. Again, this incentive has a similar effect for both segment groups. Introducing a free ticket upgrade did not work at all for the variety segment. Here, a two percent modal shift is measured, and a mere 1 percent of new visitors. Combining all four incentives yields 4 percent new visitors, and a modal shift of 20 percent.

The introduction of a parking fee however is something the amusement segment is much more sensitive to. Where the car's market share of the variety segment looses 12 percent, in the amusement segment car looses 21 percent. The loss of visitors is 5 percent in the amusement segment (3 for the variety segment). Reducing parking space gives a modal shift of 8 percent, and a loss of 2 percent. Again, the impact is heavier than for the variety segment. The combination of all train and parking incentives yields a modal shift of 45 percent, and a loss of only 3 percent, resulting in a modal shift of 1.9 :1. For the variety segment those incentives bring 4 percent new visitors and a 48 percent modal shift. It is concluded that the mobilty incentives for the amusement segment are less likely to work, and work more negatively.

Table 10.12 *Efteling*, initial modal split and modal split after interventions, with children

Take children Departure 9 AM Sunny weather	*30 minutes delay* *transfer required* *no shuttle service* *no ticket upgrade*	*30 minutes traffic jam* *free parking* *parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	8	78	15
take away delay	14	72	14
direct connection	10	75	14
shuttle service available	11	75	14
free ticket upgrade	10	76	14
combine relevant train incentives	**31**	**58**	**11**
train incentives and parking fee	47	37	16
train incentives and reduce parking space	39	48	13
combine train and parking incentives	**53**	**28**	**18**
..........+ no traffic jam	43	42	15
park management: both parking incentives	29	43	28
park management: only parking fee	24	53	23
park management: parking availability	19	64	18

The impact of removing traffic jams is similar for both segments (compare Tables 10.7 and 10.12). As for the variety segment, the limited set of variables to be directly influenced by the park's management makes it possible to enhance the modal split, but only at the cost of visitors.

10.5.2 Duinrell

Duinrell in Wassenaar is the fifth most popular attraction site in The Netherlands. It has, beside the usual outdoors attractions such as a roller coaster, a great number of indoors facilities in the *Tikibad*, making it the largest indoors 'waterpark' of Europe. The outdoors attractions are open from April to October, but the indoors waterpark is open year round. In winter the admission charge is 22 guilders (19 for children under 12). Including the outdoors attraction the entrance fee is NLG 26.50 (23.50 for children). Buses run twice per hour from The Hague Central Station, and take approximately 30 minutes. There is no shuttle service; parking is free and sufficiently available (see Table 10.13). In the initial situation, there is one train traveler on every 12.8 car drivers.

Table 10.13 *Duinrell*, initial modal split and modal split after interventions

Take children Departure 9 AM Sunny weather	*30 minutes delay* *transfer required* *no shuttle service* *no ticket upgrade*	*30 minutes traffic jam* *free parking* *parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	6	77	17
take away delay	15	70	15
direct connection	8	75	17
shuttle service available	7	76	17
free ticket upgrade	12	72	16
combine relevant train incentives	**33**	**55**	**12**
train incentives and parking fee	45	39	17
train incentives and reduce parking space	41	44	15
combine train and parking incentives	**52**	**29**	**19**

Removing train delays gives 2 percent new visitors, and a modal shift of 7 percent. Modal split (train : car) is 1 : 4.7. Taking away the transfers required for the train trip does not yield any new visitors. Result of the incentive is limited to a 2 percent modal shift. The impact of a shuttle service is even less: only one percent modal shift, no new visitors. Appendix C.3 shows that the main effect of shuttle service is compensated by a negative interaction of shuttle service and sunny weather. Apparently, the visitors only need this shuttle service with bad weather. A free ticket upgrade has a relatively great effect, thanks to the interaction of ticket upgrade with early departure. Trains to The Hague can be full early morning, and therefore a ticket for the more quiet first class would come appropriately. There is a modal shift of 5 percent, and 1 percent new visitors. The resulting modal split is (train : car) 1 : 6. All incentives combined yield 5 percent more visitors, and a modal shift of 22 percent, resulting in 6 train travelers on every 10 car drivers.

With the imposition of a 2 guilder per hour parking fee *Duinrell* looses its gain of the four train incentives. The park would therefore not win any new visitors, but still have a modal shift of 39 percent (in comparison with the initial situation). Reducing parking space, in combination with all train incentives, results in a lower modal shift, but also gives an increase in visitor figures. The combination of all train and parking incentives gives a loss of 2 percent, and a modal shift of 46 percent. There is now 1.8 train traveler on every car driver.

10.5.3 Adventure park Hellendoorn

Avonturenpark Hellendoorn is the least popular destination the for the amusement segment (see Appendix C.3). It is an outdoors amusement park in Hellendoorn, open from April to October, with an admission fee of 20 (children) or 22 guilders. People over 55 years of age have free adminssion on fridays. The adventure park is to be reached from Almelo or Nijverdal train station, where line buses depart twice per hour. Being located in less populated part of the country, we specified no traffic jam, but still possible train delays (see Table 10.14). There is one train traveler on every 21 car travelers.

Table 10.14 ***Adventure Park Hellendoorn*****, initial modal split and modal split after interventions**

Take children Departure 9 AM Sunny weather	*30 minutes delay transfer required no shuttle service no ticket upgrade*	*no traffic jam free parking parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	4	84	12
take away delay	10	79	11
direct connection	5	83	12
shuttle service available	7	82	11
free ticket upgrade	4	84	12
combine relevant train incentives	**20**	**70**	**10**
train incentives and parking fee	32	52	16
train incentives and reduce parking space	29	56	15
combine train and parking incentives	**42**	**36**	**21**
.... + traffic jam	52	22	26

Without delays 5 percent would change their mode choice behavior from car into train; one percent new visitors would be won. As a result, the modal split would change into (train : car) 1 : 7.9. A direct connection would not give much effect: only one percent modal shift, no new visitors. The modal shift would be 2 percent in favor of the train alternative with the introduction of a shuttle service, and one percent new visitors. Ticket upgrade has no significant parameter, and therefore no effect at all. All train incentives combined yield a mere 14 percent modal shift, and only 2 percent increase of visitor figures. There is one train traveler for 3.5 car drivers.

Imposing a parking fee gives an immediate loss of 6 percent for *Hellendoorn*. Also in comparison with the initial situation, we see a loss of 4 percent. The modal split (train : car) is now 1 : 1.6. Reducing the availability of parking space has an effect that is worse for the modal shift, and almost equally bad for the total participation in *Hellendoorn*. The resulting modal split is 1 : 1.9 (train : car). A combination of all incentives is not preferable for the management of *Hellendoorn*: the park would loose 9 percent visitors. The resulting modal split is 1.2 : 1 (train : car). With 'western' traffic jams, the park would again loose 5 percent. The comparison of figures demonstrates that the park profits from it situation in the congestion-free zone of The Netherlands, but that it also favors the car option instead of the train alternative.

10.5.4 Walibi Flevo

Like with the Efteling, both the amusement and variety segments did evaluate *Walibi Flevo*. Again, we can compare the two segments' evaluations. The comparison of Tables 10.10a and 10.15 shows that this park is chosen less among the members of the variety segment: they give a 26 percent non-participation, while the amusement segments has only 18. The initial modal split is (train : car) 1 : 10.7 (variety segment 1 : 8.3). It again indicates that the amusement segment is less inclined to travel by train.

Without delays the market share for train doubles, resulting in a modal split of 1 : 4.9 (train : car). Most can be accounted to a modal shift of 6 percent. Same as for the variety segment, there is no significant parameter for direct connection and therefore no effect of the incentive. A shuttle service gives 3 percent modal shift, and no extra visitors. The free upgrading of second class train tickets does not have a large impact: a mere 2 percent modal shift, no new visitors. With all three relevant incentives combined, Walibi could win 4 percent new visitors from the amusement segment, and 6 percent from the variety segment. There is a modal shift of 16 percent (variety segment 20 percent). The modal split for *Walibi*, amusement segment is 1 : 2.3 (train : car), for *Walibi*, variety segment this is 1 : 1.9.

Table 10.15 *Walibi Flevo*, initial modal split and modal split after interventions

Take children Departure 9 AM Sunny weather	*30 minutes delay transfer required no shuttle service no ticket upgrade*	*30 minutes traffic jam free parking parking space easy to find*	
	Market shares		
	Train	**Car**	**do not go**
initial situation	7	75	18
take away delay	14	69	17
direct connection	7	75	18
shuttle service available	10	72	18
free ticket upgrade	9	73	18
combine relevant train incentives	**26**	**59**	**14**
train incentives and parking fee	37	43	20
train incentives and reduce parking space	34	48	18
combine train and parking incentives	**44**	**33**	**24**

With all train incentives and a parking fee of 2 guilders per hour the loss for the park is, compared with the initial situation, 2 percent. Parking space however can be reduced without loosing visitors. Here we see a modal shift of 27 percent, and a modal split of 1 : 1.4 (train : car). The combination of both parking incentives gives another increase of the train's market share of 10 percent, but a loss of visitors of 6 percent.

10.6 Managerial initiatives and implications

The effects of the incentives described are different in terms of the modal shift caused, the opening up of new markets (or loosing visitors) and the resulting modal split. Ideally, any initiative should result in a substantial modal shift and a substantial number of new visitors. The latter can effectuate the rentability of the initiatives, and thus secure their feasibility. In this paragraph we compare and discuss the feasible effects of mobility incentives. First, the effects of all incentives combined are discussed for the three segments. Next, the potential incentives under the jurisdiction of the local park management are evaluated and compared with the impact of generic incentives.

10.6.1 All incentives

Tables 10.16 through 10.18 show the resulting figures for modal shift, market growth, and the relationshiop between the train's market share and that of the car alternative (the modal split). We specified the situations with all potential train incentives taken, and the situations with train and parking incentives combined. The initial situations were specified as previously stated. The modal shift is calculated from the initial situation, as is the market growth. Modal shift is defined as the shift from the car's market share to the train's market share, i.e., those people (percentage) who decided to a change of mode choice. Market growth is accomplished when the market share of the base alternative has decreased, and the participation rate in the destination thus has increased.

For the museum segment, he most successfull train incentives can be expected for the *Open air museum*: there is a considerable modal shift and an attractive market growth (see Table 10.3). These train incentives are by all means painless for car drivers. As a result, a modal split of 4 train travelers on 5 car drivers can be expected. There is even a chance of financing the incentives with the revenues from the parking fees. With both parking initiatives taken, this museum's visitor figures can stay level. For the *Rijksmuseum* on the other hand, there is little chance of modal shift. It must be noted that the modal split in the initial situation is already very much in favor of the train. Train incentives would mainly attract new visitors. For *Archeon* and *Kröller-Müller*, train incentives give a good effect, but parking incentives would discourage potential visitors.

Table 10.16 Effect of incentives, museum segment

	incentives	modal shift (%)	market growth (%)	modal split (train=1)
Archeon	initial			3.1
	all train	4	5	1.7
	all	26	-9	0.6
Open air museum	initial			5.1
	all train	13	10	1.2
	all	35	0	0.4
Rijksmuseum[1 2]	initial			0.8
	all train	1	11	0.4
	all[3]			
Kröller-Müller[4]	initial			5.7
	all train	6	10	1.3
	all	23	-2	0.4

Table 10.17 shows that, for the variety segment, train incentives are expected to work successfully for all destinations: they are effectuated in enormous modal shifts. Naturally, a greater modal shift can be accomplished from an initial situation that is considerably worse. However, in terms of market growth results are typically lower than for the museum segment (see Table 10.16). Apparently, the members of the variety segment are, to a greater extent than the museum visitors, choice travelers. These choice travelers have both mode options available, while the non-choice travelers, for instance, do not own a car. Among the new visitors attracted by the train incentives are possibly many of those non-choice travelers.

[1] no children
[2] bad weather
[3] no parking incentives possible
[4] no children

Both the *Efteling* and *Burgers' zoo* can take parking incentives, in combination with train incentives, without having to loose any visitors. For the *Efteling*, even a small growth can be expected.

Table 10.17 Effect of incentives, variety segment

	incentives	modal shift %	market growth %	modal split (train=1)
Efteling	initial			10.4
	all train	30	8	1.0
	all	48	4	0.4
Noorder zoo	initial			21.3
	all train	21	3	2.3
	all	46	-3	0.8
Burgers' zoo	initial			7.2
	all train	22	5	1.4
	all	43	0	0.5
Walibi Flevo	initial			8.3
	all train	14	6	1.9
	all	38	-4	0.7

Table 10.18 Effect of incentives, amusement segment

	incentives	modal shift %	market growth %	modal split (train=1)
Efteling	initial			9.8
	all train	19	4	1.9
	all	48	-3	0.5
Duinrell	initial			12.8
	all train	22	5	1.7
	all	48	-2	0.6
Hellendoom	initial			21.0
	all train	14	2	3.5
	all	47	-9	0.9
Walibi Flevo	initial			10.7
	all train	15	4	2.3
	all	43	-6	0.8

Results for the amusement segment (see Table 10.18) do not differ much from the variety segment. The initial situations are similar, but less fruitful modal shifts can be expected. Great modal shifts at all amusement parks can be accomplished with parking incentives. In all cases this would ,however, cost visitors.

10.6.2 Local management incentives vs. train incentives

The incentives described above do not only differ in impact, but also for the participants' jurisdictions. Local park or museum managers cannot directly influence the time and connection schedules of trains for instance. Shuttle services on the other hand can be introduced by the park management. Similarly, a museum, zoo or amusement park can offer a free ticket upgrade on a train ticket, e.g., at the time of buying the combined train and entrance ticket at the consumer's home station. Parking incentives are, for all destinations except the *Rijksmuseum*, the full responsibility of local management. Initiatives to reduce train delays and required transfers can be regarded as generic incentives. These are beyond the park managers' dominion, and require participation of the national railway company, the department of transport and other national authorities. Carrying out these generic incentives would take a lot more effort than the local management initiatives. The term generic here refers to the fact that the incentive does not only affect the park's consumers, but all train travelers for that particular train section. It does not necessarily mean that all train travelers in the whole country are affected, such as in general pricing incentives.

Table 10.19 shows the effects of the different incentive types for the museum segment. The effect of generic incentives is considerable for both *Kröller-Müller* and the *Open air museum.* Only for the *Rijksmuseum*, local initiatives work better than the generic incentives. Results for the other three museums show that not much is to be expected from local initiatives, especially when interventions on pricing and availability of parking are involved. In other words, generic incentives are required to support local initiatives.

Table 10.19 Effect of local and generic incentives, museum segment

	incentives	modal shift %	market growth %	modal split (train=1)
Archeon	initial			3.1
	generic	5	3	2.2
	local, train	3	2	2.5
	local, train +parking	9	-15	0.8
Open air museum	initial			5.1
	generic	13	6	1.9
	local, train	4	2	3.3
	local, train +parking	11	-17	1.0
Rijksmuseum	initial			0.8
	generic	4	4	0.6
	local, train	6	5	0.5
Kröller-Müller	initial			5.7
	generic	8	5	2.2
	local, train	4	2	3.2
	local, train +parking	7	-14	1.0

Table 10.20 Effect of local and generic incentives, variety segment

	incentives	modal shift %	market growth %	modal split (train=1)
Efteling	initial			10.4
	generic	27	6	1.5
	local, train	4	1	6.4
	local, train +parking	11	-12	2.8
Noorder zoo	initial			21.3
	generic	8	1	5.9
	local, train	5	1	8.0
	local, train +parking	15	-10	3.0
Burgers' zoo	initial			7.2
	generic	18	3	2.0
	local, train	3	0	5.3
	local, train +parking	13	-12	2.0
Walibi Flevo	initial			8.3
	generic	6	3	3.7
	local, train	6	2	4.4
	local, train +parking	16	-14	1.5

Tables 10.20 and 10.21 show a similar, but more extreme, pattern for the variety and amusement segments. The local management initiatives specified are mainly marginal in their effects; the generic incentives have a far greater impact in terms of modal shift. Removing train delays is the most important of those generic incentives. It indicates therefore that higher level participation, of the railway company for instance, is required to make mobility plans succeed.

Table 10.21 Effect of local and generic incentives, amusement segment

	incentives	modal shift %	market growth %	modal split (train=1)
Efteling	initial			9.8
	generic	11	2	3.8
	local, train	7	1	5.1
	local, train +parking	22	-13	1.5
Duinrell	initial			12.8
	generic	12	2	3.7
	local, train	7	1	5.5
	local, train +parking	19	-13	1.8
Hellendoorn	initial			21.0
	generic	8	1	5.9
	local, train	3	1	11.7
	local, train +parking	14	-18	2.9
Walibi Flevo	initial			10.7
	generic	7	1	4.9
	local, train	6	1	5.4
	local, train +parking	17	-14	1.8

11 Conclusions and Discussion

11.1 Introduction

Planning to reduce leisure car mobility is a difficult and complicated task. Policies to stimulate public instead of car transport for leisure are hindered by numerous practical obstacles, that differentiates leisure from commuter mobility. Instead of work activities, leisure activities comprise a wide range of different options and, moreover, recreation facilities are temporally and spatially deconcentrated. In addition, there are some more profound and fundamental objections against interference in individual leisure activity. Leisure and the automobile are nearly synonymously associated with freedom of choice, and freedom to do whatever one wants to do.

However, we have observed increased attention from public and private parties for the problem of growing leisure mobility. Recently, to achieve such a reduction of mobility, a number of local and regional leisure mobility plans have been designed and implemented at large scale attraction sites in the Netherlands. These plans aim at influencing the modal split at attraction destinations by trying to persuade consumers to choose different transport modes. As of today, it is not clear which of these plans have been successful, and whether these can be used for future mobility reduction plans.

An important characteristic of the mobility plans is the involvement of a wide range of participants: public and private parties, different levels of government, and transport companies. Moreover, the reclining role of the government has caused that public participants provide only limited financial support. It reflects recent trends in planning. Plans are implemented by multi-participation, and require their own economic viability. Planning has become increasingly market-oriented: the consumers finally provide the funding, and plans should therefore aim at satisfying consumer needs. Incentives are required to change the consumers' mode choice behavior. Plans that do not meet these conditions will result in declining patronage for the attraction destinations concerned, and are thus likely fail.

The orientation towards consumer use and requirements has induced the need for research to support planning decisions. This research question should give answers to the main question of how a mobility plan must be designed to accomplish the optimal result, in terms of decreased car use and at least stable patronage figures. It thus involves an understanding of consumer response to initiatives to change their behavior, whether these are effective in terms of achieving their underlying goals. It is necessary to measure the effect of all incentives independently, so that all mutual correlations and side effects can be disentangled.

Prior to the implementation of plans, feasibility studies that address this question must be conducted. Conjoint models provide a powerful instrument for this type of research. Conjoint research is used for the *a priori* evaluation of hypothetical plans and programs of planning initiatives. It involves a choice experiment, in which respondents are confronted with choice alternatives that reflect systematically varied planning initiatives. The potential consumers are asked to choose between different choice options. Based on the consumers' choice responses, a multinomial logit (MNL) model, which provides independent estimates of all plan effects, can be estimated.

Traditionally, conjoint studies examine choice in relation to consumer preference. Choices are based on the preference structure that individual consumers form of the environment. In arriving at a choice decision, individual decision makers are assumed to apply a number of rules and strategies to combine the perceived characteristics of choice alternatives into overall evaluations. However, several authors have argued that choices are also influenced by constraints. Constraints are regarded as factors that intervene in the choice decision, but not necessarily exclude participation. The preference structure can also be affected by constraints. In this study, this phenomenon is referred to as a *circumstantial* constraint: constraints interact with the attributes of choice alternatives, and thus influence choice indirectly. *Blocking* constraints affect choice in such a direct manner that participation is excluded.

Constraints do not only hinder the choice of attraction destination, but may also affect transport mode choice. In other words, people may be constrained to travel by public transport for leisure. The presence of children in the travel party is a potential constraining factor, as well as the scarce availability of time, or the absence of adequate transit facilities. To explore the decision process of transport mode choice for trips to large scale attraction sites, a new qualitative data collection procedure was developed and subsequently applied. It involved the identification of choice attributes and constraints that affect choice. An adjusted and integrated repertory grid and decision plan net approach was presented and applied for this purpose. The exploration resulted in a list of relevant factors that incorporate preferences and constraints. Not all factors are pertinent to all consumer groups; segmentation would therefore provide a better insight into the problem. Moreover, segmentation can support finding adequate strategies for mobility reduction planning. It was concluded that a segmentation based on individual preference for day-trip types is the most useful for this purpose. Hence, the (potential) market for a particular destination is identified. The segmentation resulted in four relevant market segments: *(i)* a group with a clear preference for the *Efteling* amusement park and zoos; *(ii)* an amusement park group; *(iii)* a group of beach devotees (this segment was not included in the subsequent choice experiment); *(iv)* a segment of museum enthusiasts.

The study presents a conjoint model which integrates the constraints and preference approaches. Constraints were first modeled as attributes of the choice sets, excluding participation directly (as *blocking* constraints). This involved the estimation of constraints as main effects. Secondly, constraints were estimated in interaction with attributes. This involved interaction effects: constraints thus affect choice indirectly, through interaction with the attributes of the choice alternatives (as *circumstantial* constraints). Thirdly, a model was estimated, featuring both the blocking and circumstantial components (the *all constraints model*).

In the research design, this involved varying three constraint-inducing conditions across choice sets: taking kids on the trip (or not), late or early departure, and weather outlook. Choice sets consisted of two or three choice options, featuring a base alternative and hypothetically varied combinations of existing attraction destination and mode choice incentives. These incentives represent potential planning actions, taken in order to influence the individual transport mode choice: either to discourage car use, or to stimulate train use.

The proposed models were tested for exclusive three market segments: *(i)* a group of variety seekers, who prefer both zoos and amusement parks; *(ii)* the segment of potential museum visitors; and *(iii)* the group of amusement park enthusiasts. Analysis of model results and comparison of the proposed models demonstrated that including the constraints component in the choice model leads to significantly better results. For both the variety seeking group and the potential museum visitors the *all constraints model* generates the best results, i.e. this model achieves a significantly higher model fit than the other models. For the amusement parks group, all three constraints-included models perform better than the model without constraints. The *all constraints model*, however, does not outperform the *blocking constraints model*. It suggests that, for this segment, blocking constraints are more relevant than circumstantial constraints.

The research results were made applicable for planning by means of a decision support system (DSS). Participants in leisure mobility planning, such as park managers, transport planners, and marketing managers, may use this interactive computer system in order to get direct research support upon potential initiatives and incentive ideas. Based on consumer responses to hypothetical incentives, under hypothetically varied circumstances, the research results are transformed into utility values of given choice alternatives, which in turn can be transformed into choice probabilities. The DSS presents the choice probabilities in terms of market shares for the car and train alternatives, and for non-participation. It thus demonstrates changes in modal split and patronage figures with every hypothetical action that a user puts in. An ideal combination of actions can so be composed; plans can therefore be designed and arranged with support of this DSS.

11.2 Strength, weakness and applicability

For this study, empirical data were collected on two occasions. First, exploratory and qualitative research methods were applied to identify the relevant elements of the choice decision process concerned. Based upon these data, a market segmentation was carried out as well. The first data collection was meant to provide an input for the subsequent choice experiment. Because the research subject was relatively new and unexplored, literature research could not provide sufficient information. Next, a large scale choice experiment, in which respondents were confronted with planning initiatives under controlled circumstances, was conducted

An integrated procedure for the repertory grid and decision plan net methods was developed for this research project. Repertory grids have previously been used as a qualitative method to identify contrasting elements of choice alternatives. In this study, we applied experimental design procedures to achieve control over the presented series choice alternatives, and, moreover, instead of elements that determine contrasts among alternatives, respondents were asked for elements that determine preference. Existing attraction destinations, museums, zoos, amusement parks and beach sites, were varied systematically, and respondents were requested to express their preferences and to motivate their response. The resulting choice attributes were used as the input to individual decision plans. This method was used to gain insight into the strategies that individuals apply to arrive at choice decisions. These strategies were made operational by identifying dimensions to choice attributes. Rejection inducing dimensions (RID's) represent demands of choice alternatives that are impossible to overcome. They would therefore suggest the operation of blocking constraints that exclude participation in a given trip. However, the most frequently occurring RID's relate specifically to the concerned attraction sites, and are therefore more likely indicators of certain taste and personal preference demands. Other notable RID's are variables concerning the travel party (especially children), time budget and distance related factors, and weather circumstances.

The applied methodology appeared to result in a useful list of elements that comprise the choice decision process. However, problems arise in the aggregation of individual data. Individual decision plans are idiosyncratic. It is therefore impossible to gain an overall insight into decision strategies, let alone that predictions can be made based on these decision plans. The usefulness of the method is therefore limited to the identification of attribute dimensions. Repertory grid has the advantage that any researcher or interviewer bias is absent; the respondent gets full opportunity to express his/her own individual and subjective thoughts about the choice environment. However, the problem of generalizability applies again. The adjusted integration of both methods was used to get an overall picture of the perceived attributes of choice alternatives and the strategies that are applied to combine and evaluate the attributes. Categorizations were required for the extensive list of choice attributes, with the inevitable loss of some fine distinctions. Moreover, a long list of attributes irrelevant for the purpose ensued from the used method. Most elements that determine preference of leisure attractions relate to the attraction sites as such, and not to the trips. Variables relating to transport mode, either car or public transport, seem numerically of less importance.

The distinction of market segments was conducted in order to capture these apparently important site related preference variables. The data enabled us to estimate a preference model of the existing attraction sites used. Cluster analysis resulted in clearly distinctive segments, and a number of tests provided evidence of the adequacy of this segmentation. Moreover, another set of data roughly gave similar results; it was with these segments that we conducted the choice experiment. The market segments represent the (potential) market for the attraction destinations. However, there are two important shortcomings that should be taken into account.

First, some destinations may rely heavily on foreign visitors (such as the *Efteling* and the *Rijksmuseum*), while the survey was held in The Netherlands only. In addition, in the choice experiment, the hypothetical choices were explicitly from the home address. Some leisure attraction sites receive many visitors from their holiday addresses (for instance, *Burgers' zoo*). Results can therefore only be interpreted for those domestic visitors that have departed from their home addresses. This group of domestic consumers are regarded to be the most important for mobility plans. Initiatives to stimulate train use are principally taken at the national level. Moreover, promotion of mobility measures will be primarily through national media, and will thus be directed at the domestic market.

Secondly, a relevant question would be whether the samples are representative for the attraction market. The sample has been selected from a commercial database first, which means that a substantial number of people has been filtered out. The selection questionnaire had a non-response of some 50 per cent, and for the present choice experiment, about a third of the sample refused to return their questionnaires. It is not known whether there is any bias within the actual group of respondents, either in terms of leisure preference, or transport mode preference.

The literature reports many disadvantages and limitations to stated choice modeling. However, these are largely outweighed by its benefits, possibilities and valuable properties. First of all, no other method is appropriate for such a highly reliable *a priori* evaluation of planning initiatives. Conjoint models enable a completely independent estimation of the effects of incentives, conditions, and choice alternatives. Non-existing, or yet to be implemented, hypothetical initiatives can be evaluated in terms of consumer response.

In stated choice research, it is necessary to explicit the relevant variables. This may imply that the respondent's attention is drawn to attributes that otherwise he/she might not consider. Consequently, the respondent may artificially weigh some attributes more heavily than in real world situations. This phenomenon may operate with the car incentive attributes in the present choice experiment. We made the outlook of traffic jams explicit, as well as the availability of parking spaces and the price of parking. Obviously, these may negatively influence the evaluation of an alternative, and this will be reflected in the experiment's results.

The choice experiment provides all information on planning actions (hypothetically) put into action, and respondents thus have full knowledge of the choice situation. However, in real world situations, promotion is never adequate enough to reach all consumers. Certainly the negative incentives, such as the pricing of parking spaces, will not be actively promoted. Naturally, word-of-mouth could increase the consumers' knowledge of these parking incentives, and for return visits the consumers are aware of them. It must therefore be noted that, where the model assumes full information, in the sense that consumers are fully aware of any planning-induced changes in attribute levels of the choice alternatives of interest, in real world situations there may be some delays in the availability of the information.

Another limitation of the model relates to the authenticity of choices made under experimental conditions. Here, it was not tested whether responses to the choice experiment applied here will reflect actual choice behavior. The internal validity measures represent the model fit, in other words, they indicate how adequate the model predicts the set of observations. However, it does not indicate the actual success of prediction. A test of external and predictive validity would involve a real mobility plan. Revealed choices would be used to validate stated choices. Will people in reality make the same choices as under experimental circumstances? That is to say, it should be analyzed why people would in reality deviate from their stated choices.

A misspecification of the model and an ambiguous formulation of the choice sets may cause such deviations. The questionnaire may not have completely captured the elements of the relevant choice decision process. Alternatives may not have been described well by their attributes, or some implicit associations may have played an implicit and unidentified role. An ambiguous formulation of the base alternative may cause that it does not fully include all relevant alternatives of the real choice set. In this project, a detailed analysis of the elements composing the choice decision process was carried out. In addition, the market segmentation was conducted to confront the respondents with relevant choice alternatives only. The unspecified formulation of the base alternative (*do not go*) did not compel the respondent to stay home, but comprised a whole range of other activities. It was made clear to the respondents that it should not be interpreted as inactivity, but that it could instead encompass a wide range of other leisure or non-leisure activities, such as social visits, shopping, watching television, or indeed work.

Dissimilarities between stated and revealed choices may also be caused by socially desirability of responses. In interview situations, people may have the feeling that it would be more polite or desirable to respond in a way that would never reflect their real world behavior. For instance, people may not want to admit to environmentally or politically incorrect behavior. There is however no indication that this study is subject to such *would-be-desirable* responses. No value judgments were hinted at in the questionnaire, anonymous response was secured, and there was no interference or any other action of an interviewer.

To date, the literature reports only few tests of external validity that have been conducted; naturally, it is rarely possible to gain complete control over the circumstances of actual choice behavior. Moreover, many initiatives and measures have been *a priori* evaluated but were never taken into action, and can therefore not be tested externally. Nevertheless, past research results indicate that stated choice models are generally not outperformed by models on revealed choice data (cf. Louviere & Timmermans, 1990). The impact of an extensive list of potential measures and initiatives that can be brought into action for a mobility plan is impossible to measure validly by other means than by a stated choice method. The problem of applying a revealed choice model is that the impact of a planning action is hard to estimate independently from the local situation and a specific time frame. Moreover, it is necessary that the planning initiative (i.e., that particular variable) has been put into action. Stated choice experiments give the unique opportunity to *a priori* evaluate any new planning idea. The use of quasi-experimental and panel designs offer some leverage, but still not to the degree of a full experimental design.

The decision support system (DSS) that was designed with input data of the stated choice model, can be used by planners and managers to evaluate their ideas to reduce car mobility. However, only attributes included in the research design can be modeled and thus provide the desired output data. In other words, the output depends completely on the input. The presented DSS is therefore not an instrument as such, but merely an example of what is possibly a useful tool for any planning participant. A procedure was outlined to design a specific DSS. Without much effort, a powerful research tool and interactive system to support decisions can be made operational.

The DSS has been designed to assess choice probabilities for choice sets where the consumer can choose between car and train for one destination alternative, and a base alternative. Adding more choice alternatives to a choice set will negatively affect the market share of the base alternative. Increasing the set of choice opportunities will therefore have a positive effect on participation. In those cases where different destination alternatives are added, so that more people will find an attractive alternative, the increasing participation rate is plausible. However, when the choice set is expanded with so-called *irrelevant alternatives,* the model may give unreliable results. For instance, if the choice set exists of a base alternative, one car alternative and two train alternatives, of which one with shuttle service and the other without, the model will distribute the market shares proportionally among the four alternatives. We would however expect the market shares of the car and base alternatives to remain constant, and the market share of the train option to be split between the two train alternatives. In this or any similar case, the model is not characterized by the *IIA-property*: it cannot be assumed that the model is *Independent of Irrelevant Alternatives* (cf. Tversky, 1972; Borgers & Timmermans, 1988). In this context, it should be emphasized that we were primarily interested into examining the possibility of including constraints into conjoint choice models. Now that this has been successful, future research may generalize this new approach to the case of constraints-based non-IIA models.

11.3 Recommendations for policy and planning

The three distinguished market segments react differently to the mode change incentives. Moreover, different reactions were shown for different attraction destinations. The museum segment is the most susceptible to mode change initiatives. That is to say, the best results are to be expected from initiatives at the museum sites. Fewer success can be anticipated from the amusement segment. Their response to positive train incentives is generally lower, while reactions to negative car incentives result in worse effects to overall participation.

In general, mobility reduction programs have most potential when the train schedule is enhanced substantially. The most important incentive would be to alleviate delays. Negative incentives to discourage car use, such as parking initiatives, have a great impact on modal split. However, these actions would also cause a reduction in patronage figures. The optimal solution therefore lies, for most destinations concerned, in a combination of discouraging and stimulating incentives.

Constraints work differently for the three market segments. Model tests showed that blocking constraints have the heaviest impact on the amusement segment. Circumstantial constraints are numerically the most important for the variety seeking segment. Constraints relating to the household, i.e., taking children on the trip, are important to the amusement segment, while their respective role is a lot less for the variety seekers, and nearly non-existent for the museum group. Naturally, amusement parks, of all destination types, are the most child-oriented attractions. The weather is the least important for the museum group. Time budget plays the most important role for the variety seekers.

A number of proposed and conducted mobility plans were discussed and compared in chapter 3. The plans differ in terms of objectives and targets, in terms of participating parties, and in terms of planning initiatives. In chapter 10 a distinction was made between generic train initiatives, comprising train connection and scheduling incentives, local train initiatives, and local parking initiatives. Only in the Zeeland beaches experiment, generic train initiatives were taken. That is, direct train connections were created and an adjusted train schedule was taken into action. None of the plans ruled out delays. All plans featured local train stimulating initiatives, such as a shuttle service. Parking incentives, discouraging local car use, were observed only at the Renesse transferium and Scheveningen mobility plans.

The analysis of the hypothetical incentives demonstrates that, in most cases, it is possible to reduce car use while increasing patronage. It involves, in all cases, to take the proposed train initiatives. In most cases, the best results are to be expected in combination with the parking incentives. The combination of positive train incentives and negative car incentives gives good results for the museum segment, and reasonable results for the variety and amusement segments. That is, patronage is increased or remains unchanged, while the modal split has turned in favor of train travel.

However, the influence that local managers alone can exert is limited. A great amount of the modal shift can be assigned to the generic train initiatives. These initiatives, involving train schedules, cannot be affected directly by local management. Looking at the results that can be achieved locally, the modal shifts are somewhat disappointing. Hence, to achieve the modal change necessary, involvement of the railway company and, eventually, of other participants at a higher level is required.

11.4 Suggestions for future research

This study concerns only a fraction of the total leisure mobility. Leisure mobility for holidays, short breaks, as well as for trips to destinations other than large scale attraction sites is just as damaging to the environment and requires similar mobility plans. The effects of such plans can be *a priori* evaluated and studied as well. In addition. other transport modes may be considered. Apart from public trains, other forms of collective transport can be imagined, such as organized coach trips to attraction destinations. Air travel is important for holiday travel, and is generally considered as the most environmentally damaging means of transport. A model that predicts choices between car and train, or train and air travel could be developed for this purpose. Other elements may play a role in the decision process, and different constraints may be relevant, but in essence research would be identical.

Another interesting subject of study would be to model the activities as elements of series of activities. Day-trips where more activities are planned, may influence mode choices: the car may be needed for other activities before and after the visit to the attraction destination. Such a research plan would require a more complicated design to enable the estimation of interactions among attributes for different time periods. Time budget factors may play a greater role when the choice decision process is regarded as part of a series of choices.

In this study, we modeled choices for existing attraction sites, with existing, and well-known, geographical and situational characteristics. It enabled to confront respondents with initiatives concerning infrastructure and the accessibility of destinations. However, also *spatial* initiatives can be imagined to reduce leisure mobility. One possible solution to the given problems would be to reduce traveled distances to attraction destinations, by developing sites closer to concentrations of population. An *a priori* evaluation by means of a choice experiment of such initiatives would require a completely different formulation of the survey question.

In the comparison of mobility plans in chapter 3, we discussed a proposed *transferium* to reduce the tourists' car use. At transferiums, travelers leave their cars, to continue their trips by other means of transport. More transferiums have been developed and proposed, aiming at a reduction of commuter mobility. A detailed study of *leisure transferiums* could provide interesting results, and may give solutions to the often problematic transit access to the home address.

Choices in this study were assumed to be decisions taken by individuals. However, day-trips are mostly undertaken by groups, and often all group members have a vote in the decision. Certain social interactions within the travel party therefore must play a role. An interesting research proposal would therefore be to study the choice decision process as a multi-dimensional and multi-personal one. Other elements and other constraints may play a role, and have different impacts.

For this study, resources and opportunities were not available for an external test of the results of the choice experiment. Such a validation of the stated choice outcomes would require revealed choices, and thus a real mobility plan. Ideally, the situations before and after implementation of the plan would need to be measured, in terms of modal split and visitation figures.

In chapter 3, we hinted at the present day *butterfly behavior* of leisure consumers. Variety seeking has become increasingly important, with an ongoing differentiation of the supply side as a result. As yet it is not known how these trends influence mode choices and mobility demand in general. Does the seeking of variety in leisure consumption favor environmentally friendly transport modes? One may argue that the train travel would be discouraged by the fact that it requires more information search. On the other hand, variety could maybe also be found in changing travel modes. As the *Archeon* mobility plan showed, with little effort the train-trip to the destination can be presented as an attraction as such.

One might desire a more extended DSS that allows to assess, beside the modal split between transport modes, the competition between different theme parks within a certain market segments. This DSS would show market shifts from one park to another as a consequence of certain acts of planning. The real world is naturally more dynamic than the situation as presented in the choice sets of the DSS. Market shares of, e.g., the *Efteling*, can also be affected by planning actions on the (transport) attributes of competing parks such as *Duinrell* or *Walibi*. Because the present model is not robust in terms of its IIA-property, these calculations are not possible. To account for the IIA-property, a model that allows the estimation of cross-effects must be specified (Oppewal & Timmermans, 1991). This requires an extension of the statistical design for the choice experiment.

Literature

Ajzen, I. & B.L. Driver, 1991 Prediction of the Leisure Participation from Behavioral, Normative, and Control Beliefs: An Application of the Theory of Planned Behavior. *Leisure Sciences* 23, 185-204.

Ajzen, I. & M. Fishbein, 1980. *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Ajzen, I. & B.L. Driver, 1992. Application of the Theory of Planned Behavior to Leisure Choice. *Journal of Leisure Research* 24, 207-224.

Akaike, H., 1973. Information Theory: an Extension of the Maximum Likelihood Principle, 267-281. In: B.N. Petrov & F. Csaki (eds.) *2nd International Symposium on Information Theory*. Budapest: Akademiai Kaido.

Anderson, D.A., A.W.J. Borgers, D.F. Ettema & H.J.P. Timmermans, 1992. Estimating Availability Effects in Travel Choice Modeling: A Stated Choice Approach. *Transportation Research Record* 1357, 51-65.

Anderson, N.H., 1974. Information Integration Theory: A Brief Survey. In: D.H. Kraantz, R.C. Atkinson, R.D. Luce & P. Suppes (eds.), *Contemporary Developments in Mathematical Psychology, Volume 2.*, San Francisco: Freeman, 236-301.

Anderson, N.H., 1981. *Foundations of Information Integration Theory*. New York: Academic Press.

Anderson, N.H., 1982. *Methods of Information Integration Theory*. London: Academic Press.

Ashworth, G.J. & H. Voogd, 1990a. *Selling the City: Marketing Approaches to Public Sector Urban Planning*. London: Belhaven Press.

Ashworth, G.J. & H. Voogd, 1990b. Can Places be Sold for Tourism? In: Ashworth, G.J. & B. Goodall (eds.), 1990. *Marketing Tourism Places*. New York: Routledge, 1-22.

Batenburg, R.S. & W.P. Knulst, 1993. *Sociaal-Culturele Beweegredenen: Onderzoek naar de Invloed van Veranderende Leefpatronen op de Mobiliteitsgroei sinds de Jaren Zeventig.* Rijswijk: Sociaal en Cultureel Planbureau.

Beckers, Th.A.M., 1983. *Planning voor Vrijheid. Een Historisch-Sociologische Studie van de Overheidsinterventie in Recreatie en Vrije Tijd.* Wageningen: Landbouwuniversiteit.

Beckers, Th.A.M. 1995. Tourism Planning in the Netherlands: Back to the Future. *Tijdschrift voor Economische en Sociale Geografie* 86, 93-97.

Beckers, Th.A.M. & S.F.J.M. Raaijmakers, 1991. *Tijd-Ruimtelijke Dynamiek: Onderwerpen voor Onderzoek.* Delft: PRO.

Beke, B.M.W.A., B.H.M. Elands & W.A. de Lange, 1991. *Toerisme, Recreatie en Mobiliteit: Knelpunten en Beleid, Flexibiliteit Openbaar Vervoer in Zeeland.* Arnhem: bureau Beke.

Beke, B.M.W.A., P. Sprenger, Y.M. Hazelaar & H. Volkers, 1993. Mobiliteits-communicatieplan Archeon, Demonstratieproject EZ. *Recreatie & Toerisme* september 1993, 34-35.

Ben-Akiva, M. & S.R. Lerman, 1985. *Discrete Choice Analysis: Theory and Application to Travel Demand.* Cambridge MA: The MIT Press.

Bettman, J.R., 1970. Information Processing Models of Consumer Behavior. *Journal of Marketing Research* VII, 370-376.

Bettman, J.R., 1979. *An Information Processing Theory of Consumer Choice.* Reading, Mass.: Addison-Wesley.

Bojanic, D.C. & R.J. Calantone, 1990. A Contribution Approach to Price Bundling in Tourism. *Annals of Tourism Research* 17, 528-540.

Boothby, J., M.F. Tumgatt & A.R. Townsend, 1981. Ceasing Participation in Sports Activity: Reported Reasons and their Implications. *Journal of Leisure Research* 13, 1-14.

Borgers, A. & H. Timmermans. 1988. A Context-Sensitive Model of Spatial Choice Behaviour. In: Golledge, Reginald G. & Harry Timmermans (eds). *Behavioural Modelling in Geography and Planning.* London: Croom Helm, 159-178.

Burdge, R.J., 1989. The Evolution of Leisure and Recreation Research from Multidisciplinary to Interdisciplinary. In: E.L Jackson & T.L. Burton (eds.), 1989. *Understanding Leisure and Recreation: Mapping the Past, Charting the Future.* State College, PA: Venture Publishing, 29-48.

Burton, T.L., 1989. Leisure, Forecasting, Policymaking, and Planning. In: E.L. Jackson & T.L. Burton (eds.), 1989. *Understanding Leisure and Recreation: Mapping the Past, Charting the Future.* State College, PA: Venture Publishing, 211-244.

Carmichael, B., 1993. Using Conjoint Modelling to Measure Tourist Image and Analyse Ski Resort Choice. In: P. Johnson & B. Thomas (eds.): *Choice and Demand in Tourism.* London: Mansell, 93-106.

Carson, R., J.J. Louviere, D.A. Anderson, P. Arabie, D.S. Bunch, D.A. Hensher, R.D. Johnson, W. Kuhfeld, D. Steinberg, J. Swait, H.J.P. Timmermans & J.B. Wiley, 1994. Experimental Analysis of Choice. *Marketing Letters* 5, 351-368.

CBS (Central Bureau of Statistics), 1979. *De Mobiliteit van de Nederlandse Bevolking in 1978.* Voorburg/ Heerlen: CBS.

CBS (Central Bureau of Statistics), 1983. *De Mobiliteit van de Nederlandse Bevolking in 1982.* Voorburg/ Heerlen: CBS.

CBS (Central Bureau of Statistics), 1987. *De Mobiliteit van de Nederlandse Bevolking in 1986.* Voorburg/ Heerlen: CBS.

CBS (Central Bureau of Statistics), 1991a. *De Tijdsbesteding van de Nederlandse Bevolking; Kerncijfers 1988.* Voorburg/ Heerlen: CBS.

CBS (Central Bureau of Statistics), 1991b. *De Mobiliteit van de Nederlandse Bevolking in 1990.* Voorburg/ Heerlen: CBS.

CBS (Central Bureau of Statistics), 1992. *Dagrecreatie 1990/'91.* Voorburg/ Heerlen: CBS.

CBS (Central Bureau of Statistics), 1995a. *De Mobiliteit van de Nederlandse Bevolking in 1994.* Voorburg/ Heerlen: CBS.

CBS (Central Bureau of Statistics), 1995b. *Jaarboek Toerisme en Vrijetijdsbesteding 1995.* Voorburg/ Heerlen: CBS.

Cooper, W.E., 1989. Some Philosophical Aspects of Leisure Theory. In: E.L. Jackson & T.L. Burton (eds.), 1989. *Understanding Leisure and Recreation: Mapping the Past, Charting the Future.* State College, PA: Venture Publishing, 49-68.

Coshall, J., 1985. The Form of Micro-Spatial Consumer Cognition and its Congruence with Search Behavior. *Tijdschrift voor Economische en Sociale Geografie* 76, 345-355.

Crawford, D.W. & G. Godbey, 1987. Reconceptualizing Barriers to Family Leisure. *Leisure Sciences,* 9, 119-128.

Crawford, D.W., E.L. Jackson & G. Godbey, 1991. A Hierarchical Model of Leisure Constraints. *Leisure Sciences* 13, 309-320.

Crompton, J., 1992. Structure of Vacation Destination Choice Sets. *Annals of Tourism Research* 19, 420-434.

De Jong, H.A., 1991. *Mobiliteit en Infrastructuur: Onderwerpen voor Onderzoek*. Delft: PRO.

Dellaert, B., 1995. *Conjoint Choice Models for Urban Tourism Planning and Marketing*. Ph.D. thesis, Eindhoven University of Technology.

Den Haag, gemeente, 1995. *Mobiliteitsplan Scheveningen Bad. Afstemming van toerisme, bereikbaarheid en leefbaarheid.* Den Haag: Gemeente, dienst ruimtelijke en economische ontwikkeling.

Desbarats, J., 1983. Spatial Choice and Constraints on Behavior. *Annals of the Association of American Geographers* 73, 340-357.

Dietvorst, A., 1993a. Plannning for Outdoor Recreation and Tourism in the Netherlands. In: Lier, H.N. van & P.D. Taylor (eds.), 1993. *New Challenges in Recreation and Tourism Planning*. Amsterdam: Elsevier, 69-86.

Dietvorst, A., 1993b. Planning for Tourism and Recreation: A Market-Oriented Approach. In: Lier, H.N. van & P.D. Taylor (eds.), 1993. *New Challenges in Recreation and Tourism Planning*. Amsterdam: Elsevier, 87-124.

Dietvorst, A. & M.C. Jansen-Verbeke, 1988. *De Binnenstad: Kader van een Sociaal-Geografisch Perpetuum Mobile*. Amsterdam/ Nijmegen: Nederlandse Geografische Studies, nr. 61.

Driver, B.L., 1989. Applied Leisure Research: Benefits to Scientists and Practitioners and Their Respective Roles. In: Jackson. Edgar L. & Thomas L. Burton (eds.), 1989. *Understanding Leisure and Recreation: Mapping the Past, Charting the Future*. State College, PA: Venture Publishing, 597-612.

Dunlap, R.E. & R.B. Hefferman, 1975. Outdoor Recreation and Environmental Concern: An Empirical Examination. *Rural Sociology* 40, 18-30.

Elands, B.H.M. & B.M.W.A. Beke, 1994. Mobiliteitsplan Veluwe Haalt Toerist en Recreant uit de Auto. *Recreatie en Toerisme*, september 1994, 27-29.

Elands, B.H.M., G.E. van Keken & K.B.M. Peters, 1992. *Evaluatie Dagtripper 1992, een Verzorgd Busarrangement Vanaf het Vakantieadres naar Burgers' Zoo en het Nederlands Openluchtmuseum*. Arnhem: advies- en onderzoeksgroep Beke.

Elands, B.H.M. & H.C.D.M. Oomens, 1994. Mobiliteitsplan Veluwe leidt tot Groen Vervoer Netwerk. *Recreatie en Toerisme* oktober 1994, 10-13.

Faludi, A., 1973. *Planning Theory*. Oxford: Pergamon Press.

Ferriss, A.L., 1962. *National Recreation Survey*. Outdoor Recreation Resources Review Commission Study Report No. 19. Washington, DC: U.S. Government Printing Office.

Fesenmaier, D.R., 1985. Modeling Variation in Destination Patronage for Outdoor Recreation Activity. *Journal of Travel Research* 23, 17-22.

Fesenmaier, D.R., & B. Johnson, 1989. Involvement-Based Segmentation: Implications for Travel Marketing in Texas. *Tourism Management* 10, 293-300.

Finn, A. & J. Louviere, 1990. Shopping-Center Patronage Models: Fashioning a Consideration Set Segmentation Solution. *Journal of Business Research* 21, 259-275.

Fishbein, M. & I. Ajzen, 1975. *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research.* Reading, MA: Addison-Wesley.

Fishbein, M. & M.J. Manfredo, 1992. A Theory of Behavior Change. In: M.J. Manfredo (Ed.), 1992. *Influencing Human Behavior. Theory and Applications in Recreation, Tourism, and Natural Resources Management.* Champaign, Ill.: Sagamore Publishing, Inc. , 29-50.

Fletcher, J.E., E.A. Sheffield & H.L. Furr, 1993. Assessing Public Recreation Service and Facility Preferences of Tourists and Residents at North Lake Tahoe, California. *Journal of Park and Recreation Administration* 11, 60-77.

Fodness, D., 1992. The Impact of Family Life Cycle on the Vacation Decision-making Process. *Journal of Travel Research* 31, 8-13.

Francken, D.A. & W.F. van Raaij, 1981. Satisfaction with Leisure Time Activities. *Journal of Leisure Research* 13, 337-352.

Fransella, F. & D. Bannister, 1977. *A Manual for Repertory Grid Technique.* London: Academic Press.

Geisler, G.C., O.B. Martinson & E.A. Wilkening, 1977. Outdoor Recreation and Environmental Concern: A Restudy. *Rural Sociology* 42, 241-249.

Green, P.E. & V. Srinivasan, 1990. Conjoint Analysis in Marketing: New Developments with Implications for Research and Practice. *Journal of Marketing* 54, 3-19.

Godbey, G., 1985a. Non-Participation in Public Leisure Services: A Model. *Journal of Park and Recreation Administration* 3, 1-13.

Godbey, G., 1985b. Non-Use of Public Leisure Services: A Model. *Journal of Leisure Research* 13, 337-352.

Goodale, T.L. & P.A. Witt, 1989. Recreation Non-Participation and Barriers to Leisure. In: E.L. Jackson & T.L. Burton (eds.), 1989. *Understanding Leisure and Recreation: Mapping the Past, Charting the Future.* State College, PA: Venture Publishing, 421-452.

Goossens, C.F., 1993. *Verbeelding van Vakanties. Een studie naar effecten van emotionele informatie.* Tilburg: proefschrift KUB.

Gunn, C.A., 1994. *Tourism Planning; Basics, Concepts, Cases.* Third Edition. Washington DC: Taylor & Francis.

Hägerstrand, T., 1970. What about People in Regional Science? *Papers of the Regional Science Association* XXIV, 7-21.

Hägerstrand, T., 1975. Space, Time, and Human Conditions. In: Karlqvist, Lundqvist & Snickars (eds): *Dynamic Location of Urban Space.* Farnborough: Saxon House, 3-12.

Haider, W. & G.O. Ewing, 1990. A Model of Tourist Choices of Hypothetical Caribbean Destinations. *Leisure Sciences* 12, 33-47.

Hallsworth, A.G.,1988. Repertory Grid Methodology and the Analysis of Group Perceptions in Retailing. *International Journal of Retailing* 3, 43-54.

Hanemaayer, D., 1988. *Attractiepunten en Modal Split.* In opdracht van het projectbureau Integrale Verkeer- en Vervoerstudies. Leiden: Research voor Beleid.

Henderson, K.A., D. Stalnaker & G. Taylor, 1988. The Relationship between Barriers to Recreation and Gender-Role Personality Traits for Women. *Journal of Leisure Research* 20, 69-80.

Howard, D.R. & J.L. Crompton, 1984. Who are the Consumers of Public Park and Recreation Services? An Analysis of the Users and Non-Users of three Municipal Leisure Service Organizations. *Journal of Park and Recreation Administration* 2, 33-48.

Hudson, R., 1980. Personal Construct Theory, the Repertory Grid Measure and Human Geography. *Progress in Human Geography* 4, 346-359.

Intelligent Marketing Systems, Inc., 1993. *NTELOGIT, Multinomial Logistic Regression Software, User's Manual, version 2.0.* Edmonton: Intelligent Marketing Systems, Inc..

Iso-Ahola, S.E., 1980. *The Social Psychology of Leisure and Recreation.* Dubuque, Iowa: William C. Brown Company.

Iso-Ahola, S.E., 1986. A Theory of Substitutability of Leisure Behavior. *Leisure Sciences* 8, 367-389.

Iso-Ahola, S.E. & R.C. Mannell, 1985. Social and Psychological Constraints on Leisure. In: M.G. Wade (ed.): *Constraints on Leisure.* Springfield, Ill.: Charles C. Thomas. 111-151.

Jackson, E.L., 1988. Leisure Constraints: A Survey of Past Research. *Leisure Sciences* 10, 203-215.

Jackson, E.L., 1989. Environmental Attitudes, Values, and Recreation. In: E.L. Jackson & T.L. Burton (eds.), 1989. *Understanding Leisure and Recreation: Mapping the Past, Charting the Future.* State College, PA: Venture Publishing, 357-385.

Jackson, E.L., 1991a. Special Issue Introduction: Leisure Constraints/Constrained Leisure. *Journal of Leisure Research* 23, 279-285.

Jackson, E.L., 1991b. Special Issue Introduction: Leisure Constraints/ Constrained Leisure. *Leisure Sciences* 13, 273-278.

Jackson, E.L., 1993. Recognizing Patterns of Leisure Constraints: Results from Alternative Analyses. *Journal of Leisure Research* 25, 125-149.

Jackson E.L. & T.L. Burton, 1989. Mapping the Past. In: E.L. Jackson & T.L. Burton (eds.), 1989. *Understanding Leisure and Recreation: Mapping the Past, Charting the Future.* State College, PA: Venture Publishing, 3-28.

Jackson, E.L., D.W. Crawford & G. Godbey, 1993. Negotiation of Leisure Constraints. *Leisure Sciences* 15, 1-11.

Jackson, E.L. & E. Dunn, 1988. Integrating Ceasing Participation with Other Aspects of Leisure Behavior. *Journal of Leisure Research* 20, 31-45.

Jackson, E.L. & E. Dunn, 1991. Is Constrained Leisure an Internally Homogeneous Concept? *Leisure Sciences* 13, 167-184.

Jackson, E.L. & M.S. Searle, 1985. Recreation Non-Participation and Barriers to Participation: Concepts and Models. *Loisir et Société* 8, 693-707.

Jansen, A., R. Dirksen & A. van de Korput, 1995. Recreatie-Transferium Renesse. *Verkeerskunde* 1995 3, 36-39.

Jansen-Verbeke, M.C., 1988. *Leisure, Recreation and Tourism in Inner Cities: Explorative Case-Studies.* Amsterdam/Utrecht: Nederlandse Geografische Studies, no. 58.

Jansen-Verbeke, M.C. & P. De Klein, 1989. *Bereikbaarheidsprofielen van Dagattracties.* Een Terreinverkenning en een Case-Studie. Nijmegen: Nijmeegse Planologische Cahiers, no. 33.

Johnson, P. & B. Thomas, 1993. *Choice and Demand in Tourism.* London: Mansell.

Kay, T. & G. Jackson, 1991. Leisure Despite Constraints: The Impact of Leisure Constraints on Leisure Participation. *Journal of Leisure Research* 23, 301-313.

Kelly, G. A.,1955. *A Theory of Personality, the Theory of Personal Constructs.* New York: Norton.

Kelly, J.R., 1989. Leisure Behaviors and Styles: Social, Economic, and Cultural Factors. In: Jackson. Edgar L. & Thomas L. Burton (eds.), 1989. *Understanding Leisure and Recreation: Mapping the Past, Charting the Future.* State College, PA: Venture Publishing, 89-112.

Kemperman, A., H. Oppewal, A. Borgers. & H. Timmermans, 1996. *Variety Seeking Behavior in Consumer Choice of Theme Parks.* Working paper, Eindhoven University of Technology.

Kingma, S. & M.C. Jansen-Verbeke, 1989. *Sporen naar de Vrijetijd van de Toekomst.* Tilburg: Katholieke Universiteit Brabant.

Knopp, T.B. & J.D. Tyger, 1973. A Study of Conflict in Recreational Land Use: Snowmobiling versus Ski-touring. *Journal of Leisure Research* 5, 6-17.

Law, C.M., 1994. *Urban Tourism: Attracting Visitors to Large Cities.* London: Mansell.

Lieber, S. & D. Fesenmaier, 1984. Modeling Recreation Choice: A Case Study of Management Alternatives in Chicago. *Regional Studies* 18, 31-43.

Loker, L.E. & R.R. Perdue, 1992. A Benefit-Based Segmentation of a Nonresident Summer Travel Market. *Journal of Travel Research* 30, 30-35.

Louviere, J.J., 1988. *Analyzing Decision Making: Metric Conjoint Analysis.* Beverly Hills, Cal.: Sage Publications: Sage University Papers on Quantitative Applications in the Social Sciences Series No. 07-067,

Louviere, J.J. & D.A. Hensher, 1983. Using Discrete Choice Models with Experimental Design Data to Forecast Consumer Demand for a Unique Cultural Event. *Journal of Consumer Research* 10, 348-361.

Louviere, J.J. & H.J.P. Timmermans, 1990. Stated Preference and Choice Models Applied to Recreation Research: A Review. *Leisure Sciences* 12, 9-32.

Louviere, J.J. & H.J.P. Timmermans, 1992. Testing the External Validity of Hierarchical Conjoint Analysis Models of Recreational Destination Choice. *Leisure Sciences* 14, 179-194.

Louviere, J.J. & G.G. Woodworth, 1983. Design and Analysis of Simulated Consumer Choice and Allocation Experiments: An Approach Based on Aggregate Data. *Journal of Marketing Research* 20, 350-367.

MacKenzie, J., 1992. Evaluating Recreation Trip Attributes and Travel Time Via Conjoint Analysis. *Journal of Leisure Research* 24, 171-184.

McCool, S.F. & M. Reilly, 1993. Benefit Segmentation Analysis of State Park Visitor Setting Preferences and Behavior. *Journal of Park and Recreation Administration* 11, 1-14.

McFadden, D., K. Train & W.B. Tye, 1977. An Application of Diagnostic Tests for the Independence From Irrelevant Alternatives Property of the Multinomial Logit Model. *Transportation Research Record* 637, 39-46.

McGuire, F.A., 1984. A Factor Analytic Study of Leisure Constraints in Advanced Adulthood. *Leisure Sciences* 6, 313-326.

McGuire, F.A., D. Dottavio & J.T. O'Leary, 1986. Constraints to Participation in Outdoor Recreation Accross the Life Span: A Nationwide Study of Limitors and Prohibitors. *The Gerontologist* 26, 538-544.

McGuire, F.A. & J.T. O'Leary, 1992. The Implications of Leisure Constraint Research for the Delivery of Leisure Services. *Journal of Park and Recreation Administration* 10, 31-40.

McGuire, F.A., J.T. O'Leary, C-K. Yeh & F.D. Dottavio, 1989. Integrating Ceasing Participation with Other Aspects of Leisure Behavior: A Replication and Extension. *Journal of Leisure Research* 21, 316-326.

Ministerie van Economische Zaken, 1994. *Ondernemen in Toerisme*. Den Haag: SDU.

Ministerie van Landbouw, Natuurbeheer en Visserij, 1993. *Kiezen voor Recreatie; Beleidsnota Openluchtrecreatie.* Den Haag: SDU.

Ministerie van Verkeer en Waterstaat, 1988. *Structuurschema Verkeer en Vervoer II*. Den Haag: SDU.

Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieu, 1988. *Vierde Nota Ruimtelijke Ordening*, Den Haag: SDU.

Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieu, 1992. *VINEX*. Den Haag: SDU.

Mommaas, H. & H. Van der Poel, 1989. Changes in Economy, Politics and Lifestyles: An Essay on the Restructuring of Urban Leisure. In: P. Branham, J. Henry, H. Mommaas & H. Van der Poel: *Leisure and the Urban Processes. Critical Studies of Leisure Policy in Western European Cities.* London: Routledge, 254-269.

Montgomery, D.C., 1984. *Design and Analysis of Experiments, 2nd edition*. New York: John Wiley and Sons.

Moore, K., G. Cushman & D. Simmons, 1995. Behavioral Conceptualization of Tourism and Leisure. *Annals of Tourism Research* 22, 67-85.

Mulder, M., W. Brouwer & A.W. Dersjant, 1994. De effectiviteit van mobiliteitsbeperkende maatregelen. *Verkeerskunde* 1994 6, 29-33.

National Park Service, 1995. *NPS Management Policies. Part One: Management of the National Park System.* Internet publication.

Nederlandse Spoorwegen, 1995. *Er-op-Uit!*. Utrecht: Nederlandse Spoorwegen.

NRIT (Nederlands Research Instituut voor Recreatie en Toerisme), 1995. *Trendrapport Toerisme 1994/'95*. Breda: NRIT.

Opacic, S. & R. Potter, 1986. Grocery Store Cognitions of Disadvantaged Consumer Groups: A Reading Case Study. *Tijdschrift voor Economische en Sociale Geografie* 77, 288-298.

Oppewal, H., 1995. *Conjoint Experiments and Retail Planning: Modelling Consumer Choice of Shopping Centre and Retailer Reactive Behaviour*. Ph.D. thesis, Eindhoven University of Technology.

Oppewal, H. & H.J.P. Timmermans, 1991. Context Effects and Decompositional Choice Modelling. *Papers in Regional Science* 70, 113-131.

Outdoor Recreation Resources Review Commission, 1962. *Outdoor Recreation for America*. Washington, DC: U.S. Government Printing Office.

Park, C.Whan, 1982. Joint Decisions in Home Purchasing: A Muddling-Through Process. *Journal of Consumer Research* 9, 151-162.

Park, C.Whan, R.W. Hughes, V. Thukral & R. Friedmann, 1981. Consumers' Decision Plans and Subsequent Choice Behavior. *Journal of Marketing* spring 1981, 33-47.

Park, C.Whan & R. Lutz, 1982: Decision Plans and Consumer Choice Dynamics. *Journal of Marketing Research* 19, 108-115.

Pred, A.,1986. *Places, Practice and Structure. Social and Spatial Transformation in Southern Sweden: 1750-1850*. Oxford/Cambridge.

Raad voor het Natuurbeheer, 1994. Gaan we te ver? *Pleidooi voor een bezinning op de relatie toerisme - duurzaamheid - milieu*. Utrecht: Raad voor het Natuurbeheer.

Rao, S.R., Edward G. Thomas & Rajshekhar G. Javalgi, 1992. Actvity Preferences and Trip-Planning Behavior of the U.S. Outbound Pleasure Travel Market. *Journal of Travel Research* 30, 3-12.

Raymore, L., G. Godbey, D. Crawford & A. von Eye, 1993. Nature and Process of Leisure Constraints: An Empirical Test. *Leisure Sciences* 15, 99-113.

Rijksplanologische Dienst, 1991. *Ruimtelijke Verkenningen. Jaarverslag 1991*. Den Haag: SDU.

Rojek, C., 1989. Leisure and Recreation Theory. In: E.L. Jackson & T.L. Burton (eds.), 1989. *Understanding Leisure and Recreation: Mapping the Past, Charting the Future*. State College, PA: Venture Publishing, 69-88.

Scott, D., 1991. The Problematic Nature of Participation in Contract Bridge: A Qualitative Study of Group-Related Constraints. *Leisure Sciences* 13, 279-294.

SCP, 1994. Sociaal en Cultureel Rapport 1994. Rijswijk: Sociaal en Cultureel Planbureau.

Searle, M.S. & E.L. Jackson, 1985a. Socioeconomic Variations in Perceived Barriers to Recreation Participation Among Would-be Participants. *Leisure Sciences* 7, 227-249.

Searle, M.S. & E.L. Jackson, 1985b. Recreation Non-Participation and Barriers to Participation: Considerations for Management of Recreation Delivery Systems. *Journal of Park and Recreation Administration* 3, 23-35.

Shaw, S.M., A. Bonen & J.F. McCabe, 1991. Do More Constraints Mean Less Leisure? *Journal of Leisure Research* 23, 286-300.

Smith, S.L.J, 1989. The Spatial Analysis of Recreation and Leisure. In: E.L. Jackson & T.L. Burton (eds.), 1989. *Understanding Leisure and Recreation: Mapping the Past, Charting the Future.* State College, PA: Venture Publishing, 303-330.

Spotts, D.M. & E.M. Mahoney, 1991. Segmenting Visitors to a Destination Region Based on the Volume of their Expenditures. *Journal of Travel Research* 29, 24-31.

Sprenger, P. & B.M.W.A. Beke, 1993. *Mobiliteitscommunicatieplan Archeon; Een Demonstratieproject.* Arnhem; advies- en onderzoeksgroep Beke.

Stankey, G.H. & S.F. McCool, 1989. Beyond Social Carrying Capacity. In: E.L. Jackson & T.L. Burton (eds.), 1989. *Understanding Leisure and Recreation: Mapping the Past, Charting the Future.* State College, PA: Venture Publishing, 497-516.

Stemerding, M.P., H. Oppewal, A.W.J. Borgers and H.J.P. Timmermans, 1992. The Identification of Attributes and Constraints Influencing Recreational Travel Behaviour. Paper presented at the *Joint Conference of LSA and VVS*, Tilburg 10-12 december 1992.

Stemerding, M.P., H. Oppewal, H.J.P. Timmermans & Th.A.M. Beckers, 1995. An Experimental Constraints/Preference Approach for the Management of Leisure Mobility. *Proceedings of the 4th International Outdoor Recreation and Tourism Trends Symposium,* 101-107.

Stemerding, M.P., H. Oppewal, H.J.P. Timmermans & Th.A.M. Beckers, 1995. The Application of Qualitative Methods to Identify Attributes and Constraints of Leisure Travel Decisions. Paper presented at the 1993 *NRPA Leisure Research Symposium,* October 21-23, San Jose, USA.

Stemerding, M.P., H. Oppewal, H. Timmermans & Th.A.M. Beckers, 1995. Leisure Market Segmentation: An Integrated Preferences/ Constraints-Based Approach. *Journal of Travel and Tourism Marketing,* to appear.

Stockdale, J.E., 1989. Concepts and Measures of Leisure Participation and Preference. In: E.L. Jackson & T.L. Burton (eds.), 1989. *Understanding Leisure and Recreation: Mapping the Past, Charting the Future.* State College, PA: Venture Publishing, 113-150.

Taylor, P.D, 1993. Preface. In: H.N. Van Lier, & P.D. Taylor (eds.), 1993. *New Challenges in Recreation and Tourism Planning.* Amsterdam/London/New York/Tokyo: Elsevier, 1-4.

Tensen, D.K., 1996. Personenvervoer en milieu: een reële vergelijking. *Verkeerskunde* 1996 2, 16-20.

Thrift, N.J., 1977a. Time and Theory in Human Geography Part 1. *Progress in Human Geography* 1, 65-101.

Thrift, N.J., 1977b. Time and Theory in Human Geography Part 2. *Progress in Human Geography* 1, 413-457.

Timmermans, H., 1982. Consumer Choice of Shopping Centre: an Information Integration Approach. *Regional Studies* 3, 171-182.

Timmermans, H., 1993. *Design and Decision Support Systems in Architecture.* Dordrecht/London/New York: Kluwer Academic Publishers.

Timmermans, H. & R. Van der Heijden, 1987. Uncovering Spatial Decision-Making Processes: A Decision Net Approach Applied to Recreational Behavior. *Tijdschrift voor Economische en Sociale Geografie* 78, 297-304.

Timmermans, H., R. Van der Heijden & H. Westerveld, 1982a. Cognition of Urban Retailing Structures: a Dutch Case Study. *Regional Studies* 3, 171-182.

Timmermans, H., R. Van der Heijden & H. Westerveld, 1982b. The Identification of Factors Influencing Destination Choice: An Application of the Repertory Grid Methodology. *Transportation* 11, 189-203.

Timmermans, H., R. Van der Heijden & H. Westerveld, 1984. Decision-Making Experiments and Real-World Choice Behaviour. *Geografiska Annaler* 66B, 39-48.

Toerisme & Recreatie AVN, 1995. *Groene Allianties in de Regio; 15 Voorbeeldprojecten Milieu & Toerisme in Eigen Land.* Voorschoten: Toerisme & Recreatie AVN.

Tversky, A., 1972. Elimination by aspects: A Theory of Choice. *Journal of Business Research* 23, 311-323.

Um, S. & J.L. Crompton, 1990. Attitude Determinants in Tourism Destination Choice. *Annals of Tourism Research* 17, 432-448.

Urry, J., 1990. *The Tourist Gaze: Leisure and Travel in Contemporary Societies.* London: Sage Publications.

Van der Heijden, R. & H. Timmermans, 1988. The Spatial Transferability of a Decompositional Multi-Attribute Preference Model. *Environment and Planning A* 20, 1013-1025.

Van der Heijden, R.E.C.M. & H.J.P. Timmermans, 1988. *Variatie-Zoekend Ruimtelijk Keuzegedrag van Openluchtrecreanten: Theorie, Modelvorming en Empirische Analyses.* Eindhoven: University of Technology.

Van der Heijden, R.E.C.M., A.W.J. Borgers & H.J.P. Timmermans, 1989. A Variety-Seeking Model of Spatial Choice Behavior. *Environment & Planning A* 21, 1037-1048.

Van Engelsdorp Gastelaars, R., 1989. Nederland Ontwikkelt zich tot een Pluriforme Samenleving. *Recreatie & Toerisme* 1989 11, 361-364.

Van Hagen, M. & H.P.C. van Ooststroom, 1994. Attractiepunten Bezoeken. *Verkeerskunde* 4, 48-51.

Van Hogendorp, G.F. & R.J. Bakker, 1993. Selectieve Bereikbaarheid Sleutel voor Terugdringen (Toeristisch-Recreatieve) Automobiliteit; Westerschouwen zet in op Kwaliteit Vrijetijdsbeleving. *Recreatie & Toerisme* september 1993, 30-32.

Van Keken, G.E. & A.S. Beeksma, 1995. *Met de Bus naar De Hoge Veluwe; Evaluatieonderzoek 1994.* Arnhem: advies- en onderzoeksgroep Beke.

Van Keken, G.E., B.H.M. Elands, P. Sprenger & M. Tempelman, 1995. *Een Ander Stuur in de Natuur. Evaluatie van het Toeristisch-Recreatief Mobiliteitsplan Veluwe 1992-1994.* Arnhem: Advies- en Onderzoeksgroep Beke.

Van Knippenberg, C., M. Kockelkoren & C. Korsten, 1990. Travel Behavior of Non-traditional Households. In: P. Jones (ed.): *Developments in Dynamic and Activity Based Approaches to Travel Analysis.* Avebury: Aldershot, 123-144.

Van Lier, H.N., 1993. New Challenges in Recreation and Tourism Planning. In: H.N. Van Lier, & P.D. Taylor (eds.), 1993. *New Challenges in Recreation and Tourism Planning.* Amsterdam/London/New York/Tokyo: Elsevier, 1-16.

Van Liere, K.D. & F.P. Noe, 1981. Outdoor Recreation and Environmental Attitudes: Further Examination of the Dunlap-Hefferman Thesis. *Rural Sociology* 46, 501-513.

Veal, A.J., 1993. Planning for Leisure: Past, Present and Future. In: S. Glyptis (ed.), 1993. *Leisure and the Environment: Essays in Honor of Professor J.A. Patmore.* London: Belhaven Press, 85-95.

Veling, I.H., E.C. Roelofs & J.T.A. van der Loop, 1994. Vervoerwijzekeuze: Een Kwestie van Gewoonte? *Verkeerskunde* 1994 1, 40-44.

Vijgen, J. & R. Van Engelsdorp Gastelaars, 1991. *Een Gevarieerd Bestaan. Het Gebruik van Tijd en Ruimte in het Dagelijks Leven van enkele 'Oude' en 'Nieuwe' Groepen binnen de Nederlandse Samenleving.* Amsterdam: Stedelijke Netwerken nr. 28.

Voogd, H., 1995. *Methodologie van Ruimtelijke Planning.* Bussum: Coutinho.

Wall, G., 1989. Perspectives on Recreation and the Environment, 453-480. In: Jackson. Edgar L. & Thomas L. Burton (eds.), 1989. *Understanding Leisure and Recreation: Mapping the Past, Charting the Future.* State College, PA: Venture Publishing.

Walsh, R.G., L.D. Sanders & J.R. McKean, 1990. The Consumptive Value of Travel Time On Recreation Trips. *Journal of Travel Research* 29, 17-24.

Weller, S.C. & A.K. Romney, 1988. *Systematic Data Collection.* Qualitative Research Methods Series 10. Newbury Park, Cal.: Sage Publications Inc.

Witt, P.A. & T.L. Goodale, 1981. The Relationship between Barriers to Leisure Enjoyment and Family Stages. *Leisure Sciences* 4, 29-49.

Witt, S.F. & C.A. Witt, 1992. *Modeling and Forecasting Demand in Tourism.* London: Academic Press.

Wright, B.A. & T.L. Goodale, 1991. Beyond Non-Participation: Validation of Interest and Frequency of Participation Categories in Constraints Research. *Journal of Leisure Research* 23, 314-341.

Woodside, A.G. & J.A. Carr, 1988. Consumer Decision Making and Competitive Marketing Strategies: Application for Tourism Planning. *Journal of Travel Research* 26, 2-7.

Appendix

Appendix A Emissions of pollution material in grams per traveler's kilometer, by transport mode

	car		train		
	commute	leisure	domestic	international	high speed
CO_2	190	110	66	39	50
CO	5.4	3.1	0.002	0.001	0.002
VOM[1]	1.1	0.5	0.02	0.01	0.01
NO_X	1.5	0.9	0.12	0.07	0.09
aerosols	0.03	0.01	-	-	-
SO_2	0.03	0.01	0.08	0.05	0.06

(continued)

	plane		coach		
	Europe	intercontinental	regular	day trips	long distance
CO_2	169	130	50	32	27
CO	0.3	0.2	0.3	0.2	0.1
VOM	0.01	0.01	0.2	0.1	0.1
NO_X	0.5	0.4	0.09	0.6	0.5
aerosols	NA	NA	0.08	0.05	0.04
SO_2	0.01	0.01	0.05	0.03	0.03

(continued)

	transit		
	bus	tram	metro
CO_2	114	68	78
CO	0.6	0.003	0.003
VOM	0.4	0.02	0.02
NO_X	2.0	0.13	0.14
aerosols	0.18	-	-
SO_2	0.12	0.08	0.10

(source: Tensen, 1996)

[1] Volatile Organic Material

Appendix B.1 Preference results for segment #1

	public transport trip		car trip	
N=40	parameter	SE	parameter	SE
zoos				
Antwerp	1.99**	.26	0.89**	.21
Burgers'	2.22**	.26	0.92**	.21
Artis	1.75**	.25	0.21	.20
Beekse Bergen	1.83**	.25	0.22	.19
amusement parks				
Efteling	2.38**	.26	1.28**	.23
Walibi	0.00		0.00	
Madurodam	0.87**	.28	-0.13	.21
Land van Ooit	0.74*	.28	-0.34	.23
museums				
Rijksmuseum	0.15	.27	-1.19**	.29
Open air museum	-0.15	.32	-0.26	.29
Railway museum	0.18	.30	-1.95**	.28
Kröller-Müller	-1.07*	.45	-1.56**	.30
beaches				
Hoek van Holland	0.26	.30	-1.03**	.25
Scheveningen	1.13**	.26	-0.66**	.25
Walcheren	-0.09	.28	-0.93**	.26
Renesse	-0.55	.35	-1.04**	.26

*significant at the .1 level ** significant at the .01 level

Appendix B.2 Preference results for segment #2

	public transport trip		car trip	
N=21	parameter	SE	parameter	SE
zoos				
Antwerp	-0.65*	.35	-0.72*	.34
Burgers'	0.99**	.29	-0.66*	.32
Artis	-0.18	.25	-0.99**	.32
Beekse Bergen	0.21	.25	-0.33	.28
amusement parks				
Efteling	1.83**	.32	3.07**	.58
Walibi	0.00		0.00	
Madurodam	1.34**	.30	0.68	.29
Land van Ooit	1.03**	.30	0.68	.29
museums				
Rijksmuseum	-1.17*	.33	-2.10**	.48
Open air museum	-0.15	.32	0.55	.36
Railway museum	0.22	.30	-0.89**	.29
Kröller-Müller	0.31	.30	-0.18	.31
beaches				
Hoek van Holland	-0.41	.36	-1.81**	.41
Scheveningen	-0.40	.33	-1.45**	.35
Walcheren	-1.85*	.39	-1.22**	.36
Renesse	-1.78**	.52	-1.08**	.35

*significant at the .1 level ** significant at the .01 level

Appendix B.3 Preference results for segment #3

	public transport trip		car trip	
N=26	parameter	SE	parameter	SE
zoos				
Antwerp	1.54**	.43	-0.07	.37
Burgers'	1.36**	.44	-0.16	.38
Artis	0.92*	.42	-0.77	.41
Beekse Bergen	2.25**	.42	0.67*	.31
amusement parks				
Efteling	2.32**	.43	1.16**	.35
Walibi	0.00		0.00	
Madurodam	0.74	.49	-0.05	.36
Land van Ooit	-0.20	.58	-1.57*	.50
museums				
Rijksmuseum	1.04*	.46	0.31	.35
Open air museum	1.10**	.41	1.25*	.37
Railway museum	0.34	.52	-0.62	.37
Kröller-Müller	1.92**	.43	-0.28	.38
beaches				
Hoek van Holland	2.69**	.41	0.83**	.32
Scheveningen	2.43**	.40	1.89**	.32
Walcheren	3.48**	.43	2.34**	.34
Renesse	2.57**	.42	1.52**	.32

*significant at the .1 level ** significant at the .01 level

Appendix B.4 Preference results for segment #4

	public transport trip		car trip	
N=63	parameter	SE	parameter	SE
zoos				
Antwerp	1.54**	.41	2.63**	.28
Burgers'	3.28**	.40	2.53**	.27
Artis	2.99**	.41	1.15*	.27
Beekse Bergen	2.24**	.42	1.16**	.29
amusement parks				
Efteling	2.87**	.41	2.48**	.29
Walibi	0.00		0.00	
Madurodam	2.38	.42	1.67**	.28
Land van Ooit	0.77	.47	0.35	.32
museums				
Rijksmuseum	4.32**	.41	2.52**	.27
Open air museum	3.66**	.41	2.59**	.30
Railway museum	2.71**	.41	1.97**	.26
Kröller-Müller	3.59**	.41	3.57**	.28
beaches				
Hoek van Holland	0.30	.50	0.22	.33
Scheveningen	2.07**	.42	1.13**	.27
Walcheren	1.47**	.44	1.23**	.30
Renesse	-0.45	.60	1.00**	.30

*significant at the .1 level ** significant at the .01 level

Appendix C.1 Model estimation results, museum segment

	ALL	(se)	ARCH	(se)	OPEN	(se)	RIJK	(se)	KRÖL	(se)
constant	**-.90**	.02								
destination			**.06**	.03	**.03**	.03	**.12**	.03	**-.22**	.03
car			**.35**	.04	**.42**	.04	**.15**	.04	**.39**	.04
Car										
no traffic jam			**.27**	.05	**.39**	05	**.36**	.05	**.37**	.05
free parking	**.27**	.02								
easy parking	**.28**	.02								
Train										
no delay			**.34**	.06	**.36**	.06	**.29**	.06	**.46**	.07
direct connection					**.17**	.06				
shuttle service			**.18**	.06	**.12**	.06			**.27**	.07
free ticket upgrade			**.11**	.06	**.24**	.06	**.10**	.05		
Circumstantial constraints										
Take children										
*specific destination					**.07**	.03	**-.07**	.03		
*mode (car)										
*no traffic jam			**.09**	.05			**.09**	.03		
Depart noon										
*easy parking							**-.11**	.05		
*no delay			**.14**	.06						
Sunny weather										
*specific destination			**.10**		**.26**	.03	**-.33**	.03	**-.03**	
*shuttle service							**-.12**	.05		
Blocking constraints										
Depart noon	**-.17**	.02								
Sunny weather	**.16**	.02								
Take children * Sunny weather	**.03**									
Take children * Depart noon * Sunny weather	**-.05**	.02								

Appendix C.2 Model estimation results, variety seeking segment

	ALL	(se)	EFTE	(se)	NOOR	(se)	BURG	(se)	WALI	(se)
constant	**-.89**	.02								
destination			**-.05**	.03	**.19**	.03	**.24**	.03	**-.38**	.03
car			**.41**	.04	**.51**	.03	**.53**	.03	**.49**	.04
Car										
no traffic jam			**.30**	.04	**.32**	.04	**.38**	.04	**.32**	.05
free parking	**.25**	.02								
easy parking	**.23**	.02								
Train										
no delay			**.42**	.06	**.47**	.06	**.48**	.05	**.42**	.07
direct connection			**.20**	.06	**.19**	.05	**.19**	.05		
shuttle service			**.22**	.06	**.14**	.05	**.16**	.05	**.15**	.06
free ticket upgrade					**.10**	.05	**.19**	.05	**.16**	.06
Circumstantial constraints										
Take children										
*specific destination			**.09**	.03					**-.09**	.03
*mode (car)							**.09**	.03	**.10**	.04
*no traffic jam			**.08**	.04						
*no delay			**.13**	.06						
*shuttle service					**.10**	.05				
Depart noon										
*specific destination					**-.05**	.03	**.05**	.03		
*no delay			**-.17**	.06						
*ticket upgr.					**-.12**	.05				
Sunny weather										
*specific destination					**-.06**	.03	**.05**	.03	**.01**	.03
*mode (car)					**.06**	.03				
*no traffic jam			**-.11**	.04						
Blocking constraints										
Take children	**.12**	.02								
Depart noon	**-.32**	.02								
Sunny weather	**.24**	.02								
Take children * Depart noon	**-.08**	.02								
Take children * Sunny weather	**.05**	.02								

Appendix C.3 Model estimation results, amusement segment

	ALL	(se)	EFTE	(se)	HELL	(se)	DUIN	(se)	WALI	(se)
constant	**-.96**	.02								
destination			**.27**	.03	**-.26**	.04	**.07**	.03	**-.09**	.03
car			**.50**	.04	**.55**	.04	**.50**	.04	**.55**	.04
Car										
no traffic jam			**.31**	.04	**.34**	.05	**.26**	.04	**.33**	.04
free parking	**.32**	.02								
easy parking	**.22**	.02								
Train										
no delay			**.33**	.05	**.49**	.07	**.45**	.06	**.43**	.07
direct connection			**.17**	.05	**.13**	.06	**.14**	.06		
shuttle service			**.21**	.05	**.26**	.06	**.16**	.06	**.22**	.06
free ticket upgrade			**.13**	.05			**.18**	.06	**.16**	.06
Circumstantial constraints										
Take children										
*mode (car)					**.07**	.04	**.10**	.04	**.10**	.04
*no traffic jam									**-.11**	.04
Depart noon										
*specific destination										
*free parking			**-.11**	.04	**-.09**	.05				
*easy parking					**-.10**	.04				
*ticket upgr.							**-.14**	.06		
Sunny weather										
*mode (car)			**.07**	.03						
*shuttle service							**-.10**	.06		
Blocking constraints										
Take children	**.23**	.02								
Depart noon	**-.24**	.02								
Sunny weather	**.22**	.02								
Take children * Depart noon	**-.08**	.02								
Take children * Sunny weather	**.07**	.02								
Take children * Depart noon * Sunny weather	**-.05**	.02								

Author Index

Het Modelleren van Constraints en Keuzen voor de Planning van Mobiliteit in de Vrijetijd

(ontwikkeling en test van een op constraints gebaseerd conjunct keuzemodel voor de ex ante evaluatie van toeristisch-recreatieve mobiliteitsplannen)

1. Inleiding

Sinds de tweede wereldoorlog is de consumptie van toeristisch-recreatieve producten en diensten sterk toegenomen. Uithuizige activiteiten in de vrijetijd hebben een groei van de mobiliteit veroorzaakt: er worden meer trips gemaakt in de vrijetijd, en die trips vergen grotere afstanden. De auto was de motor achter de groei van de vrijetijdsmobiliteit. De consument kon met de auto de stad ontvluchten en veel grotere gebieden dan voorheen exploreren. Sociaal-economische ontwikkelingen faciliteerden de snelle groei van vrijetijdsconsumptie: dankzij de toegenomen arbeidsproductiviteit konden werknemers meer geld verdienen in kortere tijd. Er was dus steeds meer geld en steeds meer tijd om vrijuit te besteden. De anti-urbanistische houding van de overheid die lange tijd heerste heeft bovenstaande trends versterkt. Wonen, werken en recreëren dienden ruimtelijk gescheiden te worden, waarbij het platteland het noodzakelijke complement moest vormen voor het leven in de overbevolkte stad. De bedoeling was dan ook om recreatie zover mogelijk van bevolkingsconcentraties aan te bieden. Immers, men moest letterlijk en figuurlijk zo veel mogelijk afstand van de stad kunnen nemen. Aldus werd de snelle ontwikkeling van het toeristisch-recreatieve aanbod niet beperkt langs hoofdroutes of bij concentraties van bevolking, maar ontwikkelde zich een verspreid ruimtelijk patroon van attracties, themaparken en andere toeristische bestemmingen.

Sinds kort is de anti-urbanistische houding sterk aan verandering onderhevig. De publieke opinie wordt nu beïnvloed door zorg voor het milieu en de auto is verworden van het symbool van de vrijheid tot het symbool van de vervuiling. Daar komt nog bij dat de auto congestie veroorzaakt en steeds meer schaarse (natuurlijke) ruimte opslokt. Nederland slibt dicht en niet alleen tijdens de spitsuren, maar juist in de vroegere daluren is de automobiliteit het sterkst gegroeid. Echter, gezien het zo gegroeide ruimtelijk patroon en de vermeende keuzevrijheid is het juist de auto die nodig is in de vrijetijd. Het alternatief voor de grotere afstand, openbaar vervoer, is meestal langzamer, altijd inflexibel en vergt meer organisatie van de reiziger. Op diverse overheidsniveaus, maar ook bij het toeristisch bedrijfsleven, is nu het inzicht gegroeid dat hierin een gevaar schuilt voor recreatie en toerisme. Zo zijn een aantal mobiliteitsplannen gelanceerd om de vervoermiddelkeuze ten gunste van meer milieuvriendelijke wijzen van vervoer te beïnvloeden.

Zulke plannen kunnen slechts werken als ze de aan de wensen van de consument voldoen. Daartoe is het nodig dat de uitvoerders van zo'n plan bij voorbaat weten wat het effect van eventuele ingrepen zal zijn. Marktonderzoek kan daarbij helpen. Deze studie presenteert de methode voor zulk onderzoek: een model dat planners de mogelijkheid biedt om vooraf de effecten van hun maatregelen in te schatten. In het model zijn de preferenties, de keuzen en de beperkingen, *constraints,* van de consumenten geïncorporeerd. Het model bouwt voort op de traditie van conjuncte keuzemodellen (cf. Louviere & Timmermans, 1990a; 1990b). Conventionele conjuncte benaderingen gaan ervan uit dat preferenties gedrag vormen. Echter, individuele *constraints* (cf. Godbey, 1985; Crawford *et al.*, 1991) kunnen gedrag beïnvloeden, bijvoorbeeld in de keuze voor een bepaald vervoermiddel, of voor een specifieke attractie. Planning zou effectiever kunnen zijn wanneer deze constraints bekend zijn en hoe ze gedrag beïnvloeden. Het model integreert dus constraints in een conjuncte keuzebenadering. Voor het bouwen van zo'n model is inzicht nodig in het beslissings-keuzeproces. Welke elementen spelen een rol in dat proces, en hoe? Welke relaties kunnen we onderscheiden, en hoe beïnvloeden die de keuze van toeristen en recreanten? Met de inbreng van individuele constraints in een conjunct keuzemodel proberen we voorspellende kracht van het model te vergroten en zo meer inzicht in het beslissings-keuzeproces te verkrijgen. Het model wordt toegepast in een beslissings-ondersteunend systeem, een simulatieprogramma waarin planners hun ideeën uit kunnen proberen, om uiteindelijk het meest effectieve plan te selecteren.

2. Planning en vrijetijdsmobiliteit

Mobiliteit is een essentieel aspect van recreatie en toerisme en tevens een van de grote verworvenheden van de welvaartsstaat. Cijfers laten zien dat in de laatste decennia de vrijetijdsmobiliteit sterk is gegroeid en dat, van alle activiteiten, vrijetijdsactiviteiten de meeste mobiliteit vragen. Gemeten naar gemaakte trips, is het aandeel van de vrijetijd ongeveer 30 procent. Naar afgelegde afstand gemeten, is ongeveer 40 procent van alle kilometers in de vrijetijd gemaakt. Ter vergelijking, voor woon-werkverkeer zijn de cijfers 20 respectievelijk 28 procent. Het leeuwendeel van de vrijetijdsmobiliteit gaat per auto; weinig van de toeristisch-recreatieve trips worden per openbaar vervoer afgelegd.

Ondanks het feit dat auto's in de vrijetijd meer mensen vervoeren dan voor woon-werkverkeer, heeft vrijetijdsmobiliteit heeft nog steeds een substantieel aandeel in de milieuverontreiniging. Auto's veroorzaken daarbij relatief veel schade, terwijl touringcars en treinen schoner zijn voor het milieu. Toerisme en recreatie zorgen dus voor schade met de mobiliteit die ze veroorzaken. Toerisme en recreatie dragen daartegenover bij aan de persoonlijke en sociale gezondheid en zorgen voor economische ontwikkeling en werkgelegenheid. We moeten ons dus niet zozeer richten op het tegengaan van toerisme en recreatie, maar meer op de schadelijke automobiliteit die ze met zich meebrengen.

Het is denkbaar dat succesvol ingrijpen in de vrijetijdsmobiliteit moeilijker te bewerkstelligen is. Zoals eerder werd vermeld is het locatiepatroon van toeristische en recreatieve bestemmingen diffuser, in tegenstelling tot het meer geconcentreerde patroon van werkgelegenheid. Daarnaast speelt een rol dat reizigers gevarieerde bestemmingen kiezen voor toeristische verplaatsingen, terwijl men meestal slechts één werkplek heeft. Voor die ene werkplek loont het de moeite om uit te zoeken of de auto of de trein het meest efficiënte vervoermiddel is; voor al die verschillende toeristische attracties zal men vaak niet alle voor- en nadelen van verschillende opties afwegen. Men kiest dan meestal voor het meest voor de hand liggende alternatief, de auto.

De automobiliteit in de vrijetijd is numeriek belangrijker dat het woon-werkverkeer dat alle beleidsaandacht krijgt. De ministeries van Verkeer en Waterstaat (in het *Structuurschema Verkeer en Vervoer II*, 1988) en van Volkshuisvesting, Ruimtelijke Ordening en Milieu (Rijksplanologische Dienst, 1991) zijn ook tot dit inzicht gekomen, zij het tot op heden met weinig concreet beleid. Het lijkt erop dat het ingrijpen in de toeristisch-recreatieve mobiliteit politiek gevoelig ligt. Op locaal en regionaal niveau zijn echter wel een aantal initiatieven ontplooid. Een vijftal toeristisch-recreatieve mobiliteitsplannen is geïnventariseerd. De plannen verschillen op een aantal wezenlijke punten, vooral in omvang en beleidsdoelstellingen. Wat voor alle plannen geldt is dat diverse partijen in de planvorming participeren. De betrokken partijen kunnen echter uiteenlopende beleidsdoelstellingen hebben, hetgeen een complicerende factor betekent. Daarnaast valt op dat de plannen alle sterk marktgericht zijn, ze moeten kostendekkend geëxploiteerd kunnen worden. Er zijn dus geen blijvende subsidies van de overheid.

Genoemde plannen passen binnen de ontwikkelingen die de huidige planning kenmerken. In een marktgeöriënteerde planning, wordt de inhoud van het plan grotendeels bepaald door inschattingen van het gedrag van consumenten naar aanleiding van planningsingrepen. Onderzoek naar de wensen van consumenten, en daarmee de haalbaarheid van ingrepen en (onderdelen van) plannen, kan dus een belangrijke rol spelen bij zulke gecompliceerde planningsproblemen. Het marktonderzoek naar de vraag voor toeristisch-recreatieve producten en diensten is in toenemende mate ingewikkelder geworden. Een aantal trends in de samenleving zorgen voor een toenemende diversificatie in vraag en aanbod. Tussen consumenten zien we steeds meer uiteenlopende voorkeuren; tegelijkertijd zoeken individuele consumenten steeds meer variatie in hun vrijetijdsgedrag. Het marktonderzoek voor de toeristisch-recreatieve planning dient terdege rekening te houden met dergelijke ontwikkelingen en zal bijvoorbeeld een nauwgezette analyse van de vraagzijde moeten maken en adequate marktsegmentaties moeten toepassen. Marktonderzoek kan bovendien een rol spelen in het onderhandelingsproces tussen de verschillende participanten in het plan. Gevolgen van ingrepen kunnen nauwkeurig in beeld gebracht worden zodat elke betrokkene zijn eigen doelstellingen kan toetsen. Uiteindelijk is het marktonderzoek ook een communicatiemiddel tussen aanbieders en de klanten van een voorziening. Met de onderzoeksresultaten in de hand kunnen de planmakers dus, behalve de plannen zelf samenstellen, hun strategieën voor marketing en promotie bedenken.

3. Theorie en methode

De marktgeöriënteerde planning stelt zich ten doel het menselijk keuzegedrag te beïnvloeden. Met adequate voorspellingen van de gevolgen van planningsingrepen kunnen effectieve maatregelen genomen worden. Daarvoor dienen de relaties tussen achtergrondsvariabelen, constraints, preferenties en daadwerkelijk gedrag binnen het beslissings-keuzeproces in kaart gebracht te worden. Het keuzeproces kan vanuit een aantal uiteenlopende theorieën en concepten worden benaderd. De meeste hebben gemeenschappelijk dat persoonlijke achtergronden, noden, motivaties, normen en waarden van invloed op het proces. De besproken benaderingen verschillen op de nadruk die gelegd op andere elementen binnen het beslissings-keuzeproces. Voor deze studie zijn relevant de benaderingen die zich richten op preferenties en keuze naast de stroming die zich concentreert *constraints* (beperkingen).

De preferentie- en keuzebenadering gaat ervan uit dat individueel keuzegedrag afhankelijk is van externe keuzemogelijkheden en individuele voorkeuren. Die voorkeuren worden verondersteld onafhankelijk te zijn van het aanbod. In het beslissings-keuzeproces spelen factoren als de kennis en beschikbaarheid van de set van keuze-alternatieven een rol, alsmede de subjectieve waarneming van dat aanbod. De uiteindelijke keuzeset bestaat uit alternatieven die bekend en beschikbaar zijn en waarvan de consument zich een bepaalde voorstelling heeft gemaakt. De keuze-alternatieven worden waargenomen als bundelingen van voor de consument relevante attributen (kenmerken). Evaluaties over die verschillende attributen worden gecombineerd om tot een oordeel over elk keuze-alternatief te komen. De volledige set van de (subjectieve) oordelen over alle (subjectief waargenomen) keuze-alternatieven vormt de preferentiestructuur. Normaal gesproken wordt dan het alternatief met de hoogste preferentiewaarde gekozen.

Constraints kunnen dat echter verhinderen. De beperkende factoren die optreden tussen preferentie en keuze en dus de keuze verhinderen, noemen we *blocking constraints*. Constraints kunnen echter ook op een andere wijze het keuzeproces negatief beïnvloeden. Wanneer constraints in een eerdere fase van het beslissings-keuzeproces van invloed zijn op de preferentievorming, spreken we van *circumstantial constraints*. Gedrag wordt, als gevolg van dit type constraints, niet per definitie uitgesloten; compensatie op zeer aantrekkelijke attributen van het keuze-alternatief is nog mogelijk. *Circumstantial constraints* treden op in interactie met de attributen van het keuze-alternatief, *blocking constraints* interveniëren. Wanneer *blocking constraints* optreden is geen aanpassing mogelijk, bij *circumstantial constraints* wel.

Voor het meten van de respons van consumenten op (mogelijke) planningsingrepen wordt gebruik gemaakt van de conjuncte meetmethode, in het bijzonder de *stated choice*. Bij deze methode worden series hypothetische keuze-alternatieven aan de respondent voorgelegd. De voorkeur wordt uitgesproken door het maken van keuze tussen de alternatieven. Hypothetische keuze-alternatieven worden opgebouwd uit een aantal relevante kenmerken, de *attributen*, met de daaraan verbonden niveaus. We veronderstellen dat individuen aan elk alternatief een bepaalde nutswaarde toekennen; die nutswaarde is de optelsom van de deelnutten die de respondent aan de afzonderlijke kenmerken van dat alternatief toekent. Uiteindelijk schatten we op aggregaat niveau een regressiemodel waarmee uitspraken gedaan kunnen worden hoe groot de invloed van elk afzonderlijk attribuutniveau is op de keuze voor een bepaald alternatief. Gebruik makend van experimentele design-technieken kunnen we volstaan met het voorleggen van een beperkt aantal keuze-alternatieven om alle effecten onafhankelijk te schatten. Behalve hoofdeffecten, is het ook mogelijk om bepaalde interactie-effecten te schatten. Deze geven aan wat het effect is van het gezamenlijke optreden van twee (of meer) niveaus van verschillende attributen. Vervolgens kan elk gewenste keuze-alternatief worden samengesteld en daarvan de nutswaarde worden uitgerekend. Met de nutswaarden van verschillende (samengestelde) alternatieven binnen een keuzeset bepaalt het mutinomiaal logit (MNL) model de kans dat een alternatief wordt gekozen. Deze interpreteren we vervolgens als marktaandelen. Zo kan dus het gebruik van elk denkbaar keuze-alternatief worden gesimuleerd.

Nadeel van de genoemde methode is dat het opnemen van meer attributen het aantal aan de respondent voor te leggen alternatieven meestal sterk vergroot. Bovendien neemt de complexiteit van de experimentele taak toe. Om dus te voorkomen dat respondenten de taak nauwgezet uit kunnen voeren zonder dat er verschijnselen van vermoeidheid optreden, moet erop worden toegezien dat steeds een zo eenvoudig mogelijke keuzetaak, dus met een minimum aan verschillende attributen, wordt voorgelegd. Ook het kunnen schatten van interactie-effecten vergt veelal een groter aantal voor te leggen keuzen. De moeilijkheid ligt in het vinden van de balans tussen de hoeveelheid en de kwaliteit van de informatie. Het grote voordeel van de methode is het feit dat voorspellingen gedaan kunnen worden over niet bestaande producten en plannen. Evaluaties van reeds bestaande alternatieven kunnen zelden zo nauw aansluiten bij de opzet en samenstelling van een voorgestelde plan. In een *stated choice* onderzoek kan men zeer specifieke, lokale omstandigheden meenemen en ook de respons op nog nooit eerder uitgeprobeerde initiatieven meten. Bovendien biedt de experimentele opzet de mogelijkheid om elk afzonderlijk onderdeel of maatregel onafhankelijk te meten. Bij het meten van daadwerkelijk gedrag zullen ten allen tijde correlaties en onvolledigheden optreden.

4. Identificatie van relevante elementen

Voordat we een conjunct keuze-experiment kunnen uitvoeren, moeten we eerst de relevante elementen van het beslissings-keuzeproces verzamelen. Ook is het van belang om de markt te verkennen, dat wil zeggen dat de potentiële consumenten voor de verschillende relevante attracties in kaart worden gebracht. Met beide doelstellingen is in de zomer van 1992 een dataverzameling uitgevoerd. Het betrof hier een enquête onder 150 respondenten in de regio Tilburg-Eindhoven, die bij de mensen thuis werd uitgevoerd. De onderzoeksvragen bij dit deelonderzoek waren *(i)* welke kenmerken van de verschillende attracties en vervoermiddelen neemt men waar? *(ii)* welke marktsegmenten voor de verschillende dagtochtattractie-typen kunnen we onderscheiden?

Met gebruik van aangepaste procedures van de *Repertory Grid* en de *Decision Plan Net* methodes zijn bovenstaande vragen beantwoord. Resultaten zijn een lijst met relevante attributen van de keuze-alternatieven en factoren die constraints suggereren. Wanneer we een aantal groepen onderscheiden, zien we dat achtergrondvariabelen constraints kunnen veroorzaken, maar dat niet noodzakelijkerwijs doen. Constraints kunnen dus op verschillende manieren optreden: voor sommigen als *blocking*, voor anderen bleek aanpassing mogelijk (*circumstantial*). In het algemeen blijken respondenten bij dagtochten met het OV meer eisen te stellen dan bij trips met de auto, suggererend dat tochtjes met de auto altijd aantrekkelijker zijn. Er zijn echter aanwijzingen dat individuele smaakverschillen ten aanzien van de attracties zelf veel belangrijker zijn dan de kenmerken van het vervoermiddel. Interessant nu is of bepaalde vervoersmaatregelen veroorzaken dat toeristen/recreanten *(i)* daadwerkelijk een andere attractie zullen kiezen, *(ii)* thuis zullen blijven, *(iii)* toch auto blijven rijden (kenmerken van het vervoermiddel blijken belangrijker) of *(iv)* de trein nemen. In het laatste geval kunnen de kenmerken van de attractie zelf het belangrijkst gebleken zijn of het OV aantrekkelijker te zijn geworden dan de auto. Om te achterhalen hoe de respondenten reageren op bepaalde maatregelen is een keuze-experiment nodig.

5. Marktsegmentatie

Alvorens groepen respondenten met voorgenomen beleid te confronteren is het nuttig om eerst een aantal doelgroepen vast te stellen. Met een dergelijke marktsegmentatie vooraf kan het onderzoek effectiever worden uitgevoerd. Immers, de enquête hoeft alleen bij de eventueel geïnteresseerde consumenten te worden uitgezet. Met behulp van de respons op de eerder genoemde *Repertory Grid* taak is een clustering uitgevoerd onder de respondenten van zomer 1992. Dit resulteerde in vier duidelijk te onderscheiden marktsegmenten: *(i)* strandliefhebbers, *(ii)* museumliefhebbers, *(iii)* mensen met een sterke voorkeur voor pretparken en *(iv)* mensen met een voorkeur voor pretparken en dierentuinen. Een clustering toegepast op andere data, verzameld in het najaar van 1994 onder 2450 huishoudens over heel Nederland, leverde eenzelfde uitkomst op en toonde aan dat de groep *(iv)* de neiging heeft variatie te zoeken tussen verschillende typen attracties. Hierbij dient vermeld te worden dat het strandsegment buiten beschouwing was gelaten.

Onder een selectie van de respondenten van de laatste dataset is een enquête met een keuze-experiment uitgezet. De groep was van te voren ingedeeld in de marktsegmenten met voorkeur *(ii)* museum, *(iii)* pretpark en *(iv)* pretpark en dierentuin. De groepen kregen identieke vragenlijsten voorgelegd, die alleen verschilden in de attracties die in de keuzetaak waren opgenomen. Hiertoe konden op doelmatige wijze de kenmerken van de attractie worden afgewogen tegen die van de vervoermiddelen.

6. Modelleren en simuleren van keuzen

Nadat een aantal mogelijke maatregelen zijn geselecteerd en de elementen van het beslissings-keuzeproces zijn verzameld, kunnen we de relevante marktsegmenten confronteren met de keuzetaak. In het keuze-experiment zijn vier attracties (verschillend voor de marktsegmenten) gevarieerd met twee vervoermiddelen: auto en trein. Deze 8 keuze-alternatieven werden voorts nader gespecificeerd met voor elk auto-alternatief 3 attributen en voor elk trein-alternatief met 4 attributen. Daarnaast varieerden we 3 verschillende condities die geacht werden constraints te kunnen veroorzaken. Deze waren *(i)* het al dan niet meenemen van kinderen (constraints die te maken hebben met de samenstelling van het huishouden, *(ii)* de vertrektijd is 9 of 12 uur (tijdconstraints) en *(iii)* het weer is goed of slecht.

Volgens een experimentele opzet werden de alternatieven, attributen en condities gevarieerd. De opzet was zodanig gekozen dat de volgende zaken mogelijk waren: *(i)* het effect van elk attribuut kan specifiek voor een alternatief (attractie) worden geschat, *(ii)* het effect van elke attractie kan afzonderlijk worden geschat, *(iii)* de effecten van de constraints/condities kunnen afzonderlijk worden geschat en *(iv)* de effecten van de constraints/condities kunnen in interactie met alle andere attributen worden geschat. Met *(iii)* kunnen we het *blocking* effect van de constraints meten, met *(iv)* het *circumstantial* effect.

De respondenten kregen elk 40 keuzesets voorgelegd, waarin één of twee gevariëerde profielen en een basisalternatief waren opgenomen. Hierbij vroegen we de respondenten zich een vrije dag voor te stellen en dat ze konden kiezen uit de gepresenteerde opties. Het basisalternatief was geformuleerd als *niet gaan*. De enquête werd in het voorjaar van 1995 uitgezet onder 1520 huishoudens die waren geselecteerd uit het databestand van najaar 1994. De potentiële respondenten waren vooraf toegewezen aan de drie marktsegmenten museumliefhebbers, pretparkliefhebbers en variatie-zoekenden voor pretparken en dierentuinen. Er kwamen 1004 bruikbare enquêtes terug, een gemiddelde respons van 66 procent.

Met de keuzedata is een aantal MNL modellen geschat. De modellen waren als volgt gespecificeerd: (1) het kale model, zonder de effecten van de condities/constraints, (2) het model met alleen de *circumstantial* effecten van de condities/constraints, (3) het model met alleen de *blocking* effecten van de condities/constraints en (4) het volledige model. Vergelijking van de prestaties van de modellen laat voor alle marktsegmenten zien dat de modellen waarin condities/constraints zijn opgenomen beter presteren dan het model zonder. Bij de museumliefhebbers en variatie-zoekenden loont het om zowel de *blocking* als de *circumstantial* effecten in het model op te nemen. Voor de pretparkgroep kan volstaan worden met een model waarin alleen de *blocking* effecten zijn gespecificeerd. De interne validiteit van de geschatte modellen is redelijk tot goed te noemen.

De toepassing van het model vindt plaats door middel van een keuzesimulatie in een *Decision Support System* (DSS; beslissings-ondersteunend systeem). Het DSS toont de effecten van beleidsingrepen als verschuivingen in de marktaandelen tussen de auto- en treinopties en het basisalternatief. De effecten voor de modal split en voor de totale bezoekersaantallen worden zo in kaart gebracht. Het DSS is ontworpen om beleidsmakers en planners de gelegenheid te geven de gevolgen van allerlei variaties van beleidsmaatregelen zelf in te schatten. Het gebruik van een dergelijk DSS kan nuttig zijn bij de onderhandelingen tussen verschillende (publieke en private) participanten in een mobiliteitsplan.

De gevolgen van bepaalde maatregelen zijn voor een aantal beleidsmaatregelen bij alle opgenomen attracties doorgerekend. De cijfers laten zien dat maatregelen bij de museumgroep het meeste baat hebben, en dat het segment pretparkliefhebbers het minst geneigd is de overstap van auto naar trein te maken. De respons van de laatste groep op positieve treinmaatregelen is over het algemeen lager, terwijl negatieve auto-ingrepen de slechtste effecten hebben voor de totale bezoekersaantallen.

7. Aanbevelingen

Planning om automobiliteit in de vrijetijd te reduceren is een moeilijke en gecompliceerde taak. Het mobiliteitsbeleid wordt gehinderd door praktische obstakels en emotionele hindernissen. De vrijetijdsmobiliteit verschilt op een aantal essentiële punten van het woon-werkverkeer. Behalve dat het beleid wordt gecompliceerd door het zeer grote en wijd verspreide aanbod in recreatiebestemmingen, speelt ook de geringe populariteit van beknotting in de bewegingsvrijheid een grote rol. Desalniettemin is het mogelijk om een verandering in de *modal split* bij dagtochtattracties te bewerkstelligen, zonder dat de betreffende attracties aan populariteit verliezen. Dat kan wanneer de aantrekkelijkheid en de betrouwbaarheid van de treindiensten wordt verbeterd en tegelijkertijd een aantal ontmoedigende parkeermaatregelen wordt genomen. Het spreekt voor zich dat attractieparken niet individueel kunnen ingrijpen in de bereikbaarheid per trein. Samenwerking met vervoersmaatschappijen (vooral de NS) en (lokale en regionale) overheden is daarom noodzakelijk.

Het keuze-experiment blijkt een geschikte methode voor onderzoek naar de haalbaarheid van plannen en de inschatting van effecten van maatregelen. Het opnemen van constraints verbetert de prestatie van de modellen, zij het dat dit verschilt per marktsegment. Alle effecten konden onafhankelijk worden geschat en bovendien konden we gevolgen nog niet eerder uitgeprobeerde ideeën en maatregelen doorrekenen. Er zijn echter beperkingen. Zo kunnen we geen uitspraken doen over de externe validiteit van de resultaten, omdat een toets hierop (een daadwerkelijk uitgevoerd mobiliteitsplan) niet voor handen was.

Curriculum Vitae

Marc Stemerding was born in Rotterdam on May 9th, 1967. Between 1992 and 1996, he was a PhD-student with the Urban Planning Group at the Eindhoven University of Technology. In 1991 he worked as a research assistant at the Department of Leisure Studies of Tilburg University. In 1989/'90 he worked as a planning assistant at the London Docklands Development Corporation, England.

Marc holds an MA degree (drs) in Economic Geography from the University of Utrecht (1991). His graduation thesis is on institutional investment in urban renewal. He received his secondary education at the Marnix Gymnasium in Rotterdam (1985).

Marc is currently employed at *Goudappel Coffeng adviseurs verkeer en vervoer* in Deventer. His work involves various consultancy projects, including transportation research and traffic modeling.

BOUWSTENEN is een publikatiereeks
van de Faculteit Bouwkunde,
Technische Universiteit Eindhoven.
Zij presenteert resultaten van
onderzoek en andere aktiviteiten op
het vakgebied der Bouwkunde,
uitgevoerd in het kader van deze
Faculteit.

BOUWSTENEN zijn verkrijgbaar bij:

Publikatiewinkel 'Legenda'
Hoofdgebouw 4.92
Faculteit Bouwkunde
Technische Universiteit Eindhoven
Postbus 513
5600 MB Eindhoven

of telefonisch te bestellen:
040 - 472293
040 - 472529

Reeds verschenen in de serie
BOUWSTENEN

nr.1
Elan, a computermodel for building energy design, theory and validation
M.H. de Wit
H.H. Driessen
R.M.M. van der Velden

nr.2
Kwaliteit, keuzevrijheid en kosten
Evaluatie van experiment Klarendal, Arnhem
drs J. Smeets
C. le Nobel, arch. HBO
M. Broos, J. Frenken, A. v.d. Sanden

nr.3
Crooswijk
van 'bijzonder' naar 'gewoon'
drs V. Smit
ir K. Noort

nr.4
Staal in de woningbouw
ir E.J.F. Delsing

nr.5
Mathematical theory of stressed skin action in profiled sheeting with various edge conditions
ir A.W.A.M.J. v.d. Bogaard

nr.6
Hoe berekenbaar en betrouwbaar is de coëfficiënt k in $\bar{x}$ - ko en $\bar{x}$ - ks?
ir K.B. Lub
drs A.J. Bosch

nr.7
Het typologisch gereedschap
Een verkennende studie omtrent typologie en omtrent de aanpak typologisch onderzoek
J.H. Luiten arch. HBO

nr.8
Informatievoorziening en beheerprocessen
ir A. Nauta / drs J. Smeets (red.)
Prof. H. Fassbinder (projectleider)
ir A. Proveniers,
drs J.v.d. Moosdijk

nr.9
Strukturering en verwerking van tijdgegevens voor de uitvoering van bouwwerken
ir W.F. Schaefer
ir P.A. Erkelens

nr.10
Stedebouw en de vorming van een speciale wetenschap
K. Doevendans

nr.11
Informatica en ondersteuning van ruimtelijke besluitvorming
dr G.G. van der Meulen

nr.12
Staal in de woningbouw, korrosie-bescherming van de begane grondvloer
ir E.J.F. Delsing

nr.13
Een thermisch model voor de berekening van staalplaatbeton-vloeren onder brandomstandigheden
ir A.F. Hamerlinck

nr.14
De wijkgedachte in Nederland
Gemeenschapsstreven in een stedebouwkundige context
dr ir K. Doevendans
dr R. Stolzenburg

nr.15
Diaphragm effect of trapezoidally profiled steel sheets.
Experimental research into the influence of force application
ir A.W.A.M.W. v.d. Bogaard

nr.16
Versterken met spuit-ferrocement.
Het mechanische gedrag van met spuit-ferrocement versterkte gewapende betonbalken
ir K.B. Lub
ir M.C.G. van Wanroy

nr.17
De tractaten van
Jean Nicolas Louis Durand
ir G. van Zeyl

nr.18
Wonen onder een plat dak.
Drie opstellen over enkele vooronder-stellingen van de stedebouw
dr ir K. Doevendans

nr.19
Supporting decision making processes
A graphical and interactive analysis of multivariate data
drs W. Adams

nr.20
Self-help building productivity
A method for improving house building by low-income groups applied to Kenya 1990-2000
ir P. A. Erkelens

nr.21
De verdeling van woningen:
een kwestie van onderhandelen
drs V. Smit

nr.22
Flexibiliteit en kosten in het ontwerp - proces Een besluitvormingonder-steunend model
ir M. Prins

nr.23
Spontane nederzettingen begeleid
Voorwaarden en criteria in Sri Lanka
ir P.H. Thung

nr.24
Fundamentals of the design of bamboo structures
O. Arce-Villalobos

nr.25
Concepten van de bouwkunde
Prof. dr ir M.F.Th. Bax (red.)
dr ir H.M.G.J. Trum (red.)

nr.26
Meaning of the site
Xiaodong Li

nr.27
Het woonmilieu op begrip gebracht
Jaap Ketelaar

nr.28
Urban environment in developing countries
editors: dr ir Peter A. Erkelens
dr George G. van der Meulen

nr.29
Stategische plannen voor de stad
Onderzoek en planning in drie steden
Prof. dr H. Fassbinder (red.)
ir H. Rikhof (red.)

nr.30
Stedebouwkunde en stadsbestuur
ir Piet Beekman

nr.31
De architectuur van Djenné
Een onderzoek naar de historische stad
P.C.M. Maas

nr.32
Conjoint experiments and retail planning
Harmen Oppewal

nr.33
Strukturformen Indonesischer Bautechnik Entwicklung methodischer Grundlagen für eine 'konstruktive pattern language' in Indonesien
Heinz Frick

nr.34
Styles of architectural designing
Empirical research on working styles and personality dispositions
Anton P.M. van Bakel

nr.35
Conjoint choice models for urban tourism planning and marketing
Benedict Dellaert

nr.36
Stedelijke Planvorming als co-produktie
Prof. dr H. Fassbinder (red.)

nr 37
Design Research in the Netherlands
editors: Prof. dr R.M.Oxman,
Prof. dr ir. M.F.Th. Bax,
Ir H.H. Achten

nr 38
Communication in the Building Industry
Bauke de Vries

nr 39
Optimaal dimensioneren van gelaste plaatliggers

nr 40
Huisvesting en overwinning van armoede
dr.ir. P.H. Thung en dr.ir. P. Beekman (red.)

nr 41
Urban Habitat: The environment of tomorrow
George G. van der Meulen,
Peter A. Erkelens

nr 42
A typology of joints
John C.M. Olie