Destination choice modelling for different leisure activities
Destination choice modelling of leisure trips: The case of Switzerland

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Zielwahl bei Freizeitwegen: Beispiel Schweiz

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Kurzfassung

In diesem Aufsatz wird die Zielwahl von in der Schweiz Lebenden innerhalb der Schweiz analysiert. Ziel hierbei ist es, Informationen über Variablen, die die Zielwahl für eine bestimmte Aktivität beeinflussen, zu erhalten.

Die Analysen stützen sich auf drei Pfeiler. Der erste Pfeiler ist eine detaillierte Datenbank aller Schweizer Gemeinden. Schweizweite Nachfragedaten zu den Freizeitwegen bilden den zweiten Pfeiler. Eine Analyse der Zielwahl wäre nicht möglich ohne eine entsprechende Methode. Da es sich bei der Zielwahl um diskrete Entscheidungen handelt, werden multinominale Logitmodelle verwendet.

Es werden Modelle für drei Aktivitätentypen geschätzt - Skifahren, Wandern und Bergsteigen beziehungsweise Spazieren und Schwimmen. In allen Modellen zeigt sich die grosse Bedeutung der Distanz zwischen Quelle und Ziel für die Wahl einer Destination. Zudem spielt auch die infrastrukturelle Ausstattung einer Gemeinde eine Rolle.

Schlagworte

Freizeitverkehr; Zielwahl; Skifahren; Wandern; Bergsteigen; Logitmodelle; Schweiz; ETH Zürich; Institut für Verkehrsplanung und Transporttechnik, Strassen- und Eisenbahnbau (IVT)

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Abstract

In this paper the destination choice of Swiss within Switzerland is analysed. Information about variables influencing destination choice for different activity should be the result of the modelling process.

The analyses are based on three pillars. A detailed database for all Swiss municipalities is the first pillar, nation wide demand data the second pillar. Additionally a suitable method is necessary. Because destination choice is a choice between discrete alternatives, Multi-nominal Logit models are used.

Models for three different activity types - skiing, climbing and hiking respectively walking and swimming are estimated. In all models the importance of the distance between origin and destination becomes visible.

Keywords

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1.   Introduction

Leisure has become the most important trip purpose. In 1994 60% of all person kilometres respectively 80 billion person kilometres travelled by the residents of Switzerland were made for the purpose leisure; half of those kilometres were performed abroad. Most of these leisure trips (66% of all trips made by Swiss in Switzerland) were made by private car. Therefore leisure traffic is a major contributor to the well known negative effects of motorised traffic. Especially in tourist areas leisure traffic has serious ecological and social impacts.

To analyse leisure traffic is not only interesting because of its volume, but also because of an other special feature. Leisure traffic is very heterogeneous - especially compared to work trips. Different leisure activities like sports, cultural sightseeing or visiting friends are carried out at the same destination; at the same time similar activities are carried out at different destinations. Additionally leisure activities are generally characterised by less rigid temporal constraints than for example work or school activities.

In contrast to the significant contributions of leisure traffic to overall traffic, it has received relatively little attention in travel modelling practice - mostly because of its heterogeneity and consequently the problems connected with analysing leisure trips. However, some recent studies have underscored the need to model leisure trips and predict visitor flows more systematically and to recognise the behavioural differences underlying travel decisions for different types of leisure trips (Bhat, 1998; Pozsgay and Bhat, forthcoming).

The aim of this paper is to contribute towards this growing literature on leisure travel. It especially focuses on destination choice within Switzerland for different activity types. Destination choice is a choice between discrete alternatives. Therefore the method of discrete choice models, which can analyse the choice of a destination dependent on the type of destination and the personal situation of the travellers, is appropriate here. Based on the results of the models conclusions can be drawn about how a municipality can act to reach its goal with regard to leisure and tourism. It is of special interest to investigate the influence of the quality of the natural environment on those choices.

The remainder of this paper is structured as follows: This foreword is followed by an introduction to the theory of the method used - discrete choice models. The next section presents very briefly the data base used. Then the different steps during the development and specification of the models presented are introduced. The fifth section shows the empirical results.

The final section summarises the findings from the models and discusses the relevance of these findings.

2. Discrete choice models

Participation in traffic always forces persons to choose one alternative out of a set of alternatives which exclude each other mutually (for example mode choice: One cannot choose the car and ride a bike at the same time). Qualitative choices out of a set of distinct and non divisible alternatives can be modelled using *random utility discrete choice models*.

2.1 Theory

Discrete choice models are based on the assumption, that persons are trying to maximise the utility of their performed activities and therefore choose that alternative out of all possible activities which is likely to offer them the highest utility. Although it is obvious that this assumption is an oversimplification of human behaviour, models based on this assumption obtain results which are much more realistic than models based on gravitation or entropy theory. A more detailed description of discrete choice models can be found in Ben-Akiva and Lerman (1985), Maier and Weiss (1990), Ortúzar and Willumsen (1994); the basic ideas were developed by McFadden (1973).

There are different types of discrete choice models. All of them share the assumption, that out of a set of alternatives each person q expects a different utility (U). Each alternative j can be described by different characteristics x, whose values vary across different alternatives. Each utility depends on the different judgements of those characteristics. The judgements can at least partially be derived from different personal factors p, for example gender or age. Additionally the evaluation of the utility of an alternative depends on the situational factors s, for example the weather conditions or the travel time, which vary between different persons and alternatives.

As it is neither possible to know all relevant characteristics or choice alternatives nor to measure them exactly, the judgement is composed out of a deterministic and a (at least from the analyst's point of view) stochastic part. The total utility can thus be calculated as:

$$U_{jq} = V_{jq} + e_{jq} \qquad\qquad (1)$$

with V_{jq} as systematic and measurable part which describes the objective utility of alternative *j* for person *q* and the random error ε_{jq}, which modifies V_{jq} with regard to the individual judgements of a decision maker and possible errors in observation or measurement. The systematic utility is a function of characteristics describing the individuals, the situation and the alternative

$$V(X_{kjq}) = \quad \alpha_j + \Sigma \beta_{k''j}\, p_{k''q} + \Sigma \beta_{k'j}\, s_{k'q} + \Sigma \beta_{kj}\, x_{kjq} \qquad\qquad (2)$$

The stochastic part of the utility function depends on the assumption about its distribution which is at the same time the distinguishing mark between the different model types. The most simple and according to Maier and Weiss (1989) most commonly used version of discrete choice modelling is the *Multinominal Logit* (MNL), which is based on the assumption that ε_{jq} is *independent and identically gumbel distributed* (Ben-Akiva and Lerman, 1985). This so-called IIA-assumption (independence of irrelevant alternatives) implies some constraints on the application of the model which can be released in other model types. The linear utility function represents a further model restriction.

The probability *P* that an alternative *j* of a Person *q* is ranked first can be calculated as the utility of this alternative in relation to the sum of all alternatives (see equation 3). In the MNL the relationship between utility and probability of an alternative is described as follows. The alternative with the highest probability is chosen.

$$P_{jq} = \frac{e^{V_{jq}}}{\displaystyle\sum_{\forall n} e^{V_{nq}}} \qquad\qquad (3)$$

2.2   Destination choice

Destination choice models are rarer then mode choice models. With the choice of a specific destination for a leisure trip the decision making person excludes the choice of other destina-

tions due to spatial and temporal constraints. Therefore the MNL model seems to be an appropriate method here. But it is important to mention a view particularities of destination choice.

- **IIA-assumption**: This assumption implies that the error terms of the utility function for all possible alternatives are independent and identically distributed with a gumbel distribution. If the error terms are independent, no common unobserved factors have any impact on the different alternatives. The assumption of identical distribution means that the level of impact of the factors, which were not detected, is identical across all alternatives. This assumption is often not fulfilled in destination choice. For example, the impact of different levels of comfort is different in a luxurious area compared to a camping region.

- **Homogeneity of travellers**: In a MNL it is assumed that different persons react homogeneously in response to attributes of alternatives regardless of their socio-demographic background. This assumption is also often violated for destination choice. For example, for some people it is important to go to a destination very far away in their holidays because of the image of such trips. Other people may avoid such trips in order to reduce their travel time.

- **Spatial issues**: Travel demand is influenced by at least three different spatial issues: spatial dependency, spatial heterogeneity and spatial heteroscedasticity (Bhat and Zhao, 2001). The spatial dependency describes the presence of unobserved spatial factors influencing travel behaviour - for example a beautiful landscape. The second issue, spatial heterogeneity, proposes that the relationship between the dependent variable and the independent one varies across spatial units - as a consequence, it may be possible that there is no single global relationship, but different local ones. The last possible source of biases is spatial heteroscedasticity, which reflects the fact that the variance of the unobserved influences may be different across spatial units.

Due to these limitations the MNL estimates give only first approximations about the impacts of different characteristics, but it should be kept in mind that its results may be biased and that more complicated models should be developed in the future.

3.   Data base

The aim of this paper is to estimate models describing destination choice within Switzerland for different activities at the municipal level. Destination choice is dependent on the characteristics of the alternatives and of the travellers. Therefore, it is necessary to have information about the demand and the supply side for the whole investigated area. Additionally the distance between the origin and the destination has to be considered (see 4.2.3).

3.1   Supply side

A detailed data set was produced to describe the destinations and their supply. The data set contains detailed information about the residents, the supply in the leisure and tourist sector, the tourist demand as well as the allocation of the space to different purposes (hectare data bank). The hectare data bank includes even information about different vegetation types (for example open and closed forest or vines). The municipal level was chosen as investigation level, because it is the lowest level at which information for a whole nation can be collected.

There is a problem inherent in this investigation level. The travellers respectively visitors think in destination units rather than in municipal units. Sometimes this unit is much smaller than a municipality. The consideration of such small destinations would create an enormous number of different alternatives which would make the modelling process too difficult. At the same time, different municipalities are sometimes viewed as one destination. Especially for skiing holidays people visit a complete valley or ski region rather than a municipality. However, the municipality level is a compromise between these different requests, which seems to be a sufficient approximation of the reality.

3.2   Demand side

A nation wide analysis of destination choice requires demand information for the same area. In Switzerland several nation wide travel surveys exist – of those the *KEP* ('Kontinuierliche Erhebung zum Personenverkehr') and the *Zusatzmodul Reiseverhalten* are available and appropriate. They were pooled for this analysis.

- **KEP** (SBB CFF - Direktion Personenverkehr, 1996): The SBB (Swiss Federal Railways) are responsible for the KEP, which covers the travel behaviour of Swiss adults. During one year about 17'000 persons are interviewed. The KEP has been conducted yearly since the 80ies, but the destinations of car trips have only been coded in the last two years, while this was done longer for rail trips. Therefore just the survey years 2000 and 2001 are used which already includes about 120.000 trips.

  Information about the personal situation of the travellers and about their trips over three kilometres distance and a municipal boundary during the last week is collected. For each trip the destination is known except for trips abroad which are just coded as destination outside Switzerland. Attention should also be paid to the fact, that for public transport trips the rail station is assumed to be the final destination.

- **Zusatzmodul Reiseverhalten** (Bundesamt für Statistik, 1999): This survey was conducted by the BfS (Swiss federal statistical office) within the context of the Swiss

income and consumption census in 1998. Therefore not only the trip characteristics and the typical person variables are available, but also information about a variety of other interesting variables, for example the living situation or the purchase of expensive consumer goods.

Approximately 7.300 persons reported over 23.000 trips which were either a holiday trip within the last 6 months, a trip with up to three overnight stays within the last three months or an excursion within the last two weeks. Unfortunately only the destinations of the excursion are known.

4. Model preparations

Several assumptions must be made, before models can be estimated. On the one hand the choice set must be generated. Because of the great number of possible alternatives this step is not trivial. On the other hand the variables used in the models must be selected. Here theoretical considerations and the availability of variables are decisive.

4.1 Basic idea

The models are based on the idea that leisure consists of very different activities which satisfy different desires and are influenced by completely different impacts. As leisure is so diverse, it is necessary to concentrate on different types of leisure activities. Three different activity groups, which represent popular outdoor activities, were chosen for the models presented here. **Skiing** is used as a representative of a winter activity, because it is one of the most important leisure activities in Switzerland. According to Brandner, Hirsch, Meier-Dallach, Sauvain and Stalder (1995) it is performed by approximately 20% of all Swiss at least once a year.

In summer the activity groups - **climbing and hiking** as well as **walking and swimming** - were chosen in order to avoid activities that are performed by just a very small subgroup of the population. The division in two different types was necessary, because a brief look at the visited destinations has shown that two different types of places were the most frequent visited destinations. One group consisted of places at lakes, which are suitable for walks as well as for swimming, the second group of popular places is located in the mountain regions.

4.2   Choice set

According to Swait (2001) the true choice set of travellers is normally unknown to the analysts, as only the chosen alternative can be observed. Consequently a choice set has to be constructed by the analyst. Biases in the choice set can occur, if an alternative is present that in reality is impossible for the traveller to choose. The alternatives inherent in a choice set can mostly be described by a variety of different variables, whereby the potential variables are dependent on the considered purpose.

4.2.1   Generation of alternatives

Modelling destination choice at the municipal level has to deal with the problem that a large number of alternatives is conceivable. One possibility to cope with this situation is to draw a subset of alternatives from the universal choice set for each trip. If the error terms are identically and independently distributed, this procedure is acceptable (McFadden, 1978). Ben Akiva, Gunn and Silman (1985) presented several methods how a subset can be drawn. The simplest approach which was adopted for example by Pozsgay and Bhat (forthcoming) is to add a random sample of non-chosen alternatives to the alternative which was indeed chosen.

This approach was also adopted here by adding nine randomly selected destinations, which were different from the chosen alternative, to the chosen alternative. As Switzerland consists of very different structured municipalities, the set of possible alternatives was restricted according to the considered activity types.

- **Model for skiing**: It was assumed that the destination of a trip with the purpose skiing must be a skiing resort. A municipality is regarded as a skiing resort if it has access to lifts - either directly or through a skibus. 176 municipalities fulfilled this criterion.

- **Model for hiking and climbing**: It was assumed that these activities are performed in municipalities located over 800 meters. Most of the sampled municipalities – in total 555 - are located in the Alps, which are popular for this kind of activities.

- **Model for walking and swimming**: It was assumed that municipalities located below 600 meters, which are not a town, are predestined for these activities. 1'716 municipalities were selected.

4.2.2 Selection of alternative specific variables

For the activity skiing objective factors, like price level, snow conditions, accessibility or number of lifts, as well as subjective factors, like the atmosphere or the friendliness of the other guests and residents, are important (Klassen, 2001; Klenosky, Gengler and Mulvey, 1993). A study about the price level of different Swiss skiing resorts has shown, that much variability can be explained by objective factors (Berwert, Bignasca and Filippini, 1995-1996). But the ski facilities themselves are not the only attraction for the tourists. Brandner, Hirsch, Meier-Dallach, Sauvain and Stalder (1995) pointed out, that new offers for special sport segments like snowboarding, aprés ski facilities and non-ski facilities in case of bad weather (for example public indoor pools) are also crucial for ski areas to attract tourists.

Most of these objective variables are in the data set, whereby height is used as indicator of the probability of good snow conditions (see Table 1). Additionally variables describing the subjective quality of the resort were added. These variables are based on a five point scale concerning the quality of the alpine ski tracks, the quality of snow board facilities, the quality of cross country ski tracks, the quality of aprés-ski and the presence of a skibus (ADAC, 2001).

Table 1   Descriptive statistics of the variables for the skiing model

	Mean	Standard deviation	Minimum	Maximum
Height of municipality [m]	1'120	351	397	1'904
Number of inhabitants	1'767	2'787	31	30'800
Area with forest [ha]	1'161	1'013	36	5'017
Unvegetated or unproductive area [ha]	2'102	3'483	0	20'640
Number of ski lifts	6	8	0	44
Price for a ticket (one week) [SFr]	185	48	146	360
Total length of alpine tracks	144	136	0	650
Quality of alpine skiing area	3.35	1.04	0	5
Quality of Après-ski	3.09	0.93	0	5
Availability of a skibus	0.72	0.45	0	1
Belonging to the skiing area	0.53	0.50	0	1
Number of ice skating facilities	0.53	0.87	0	4
Number of public indoor pools	0.80	1.47	0	9
Number of indoor tennis courts	0.14	0.34	0	1
Number of accommodations	12	15	0	110
Number of entertainment facilities	10	14	0	132

Describing the supply for the summer activities is much more difficult than describing the supply for skiing, because these activities are not so dependent on a specific infrastructure. Additionally the literature is not as rich as in the case of skiing. Nevertheless it is necessary to make an attempt to model these activities, because hiking is the most popular outdoor leisure activity. Characteristics of this activity are that it is carried out unorganised, that beautiful landscapes are preferred and that people like to combine this activity with other activities (Mielke, 1994).

Although the destinations are not as easy to identify as for skiing, there are in summer municipalities which are more frequent visited than others. This observation suggests that there are natural elements respectively facilities which determine the attractiveness of a municipality as a destination for an excursion. A beautiful landscape, sport, cultural and eating facilities or bath-

ing possibilities are conceivable variables (see Table 2 and Table 3), whereby it is assumed that their influence differs with regards to the chosen activity (climbing and hiking versus walking and swimming).

Table 2　　Descriptive statistics of the variables for the climbing and hiking model

	Mean	Standard deviation	Minimum	Maximum
Height of municipality [m]	1'098	258	799	1'948
Number of inhabitants	894	1'989	24	36'999
Area with closed forest [ha]	600	667	0	5'152
Area with open forest [ha]	94	126	0	1'025
Area with bushes [ha]	70	150	0	1'302
Area with copses [ha]	89	100	0	739
Unproductive area [ha]	336	580	0	3'829
Area without vegetation [ha]	888	2'067	0	18'878
Area with meadows [ha]	45	93	0	819
Area with alpine pastures [ha]	637	890	0	7'518
Area with golf courses [ha]	0.58	4.00	0	53
Hiking paths [km]	50	58	0	455
Employees in eating facilities	60	167	0	1'798
Number of baths in lakes	0.03	0.21	0	2
Number of outdoor pools	0.22	0.73	0	6
Number of outdoor tennis courts	0.35	0.89	0	10

Table 3   Descriptive statistics of the variables for the walking and swimming model

	Mean	Standard deviation	Minimum	Maximum
Height of municipality [m]	460	78	200	601
Number of inhabitants	2'847	4'915	26	87'697
Area with closed forest [ha]	272	346	0	3'792
Area with open forest [ha]	8	35	0	430
Area with meadows [ha]	2	15	0	330
Area with parks [ha]	1.21	3.58	0	52
Area with golf courses [ha]	0.34	3.20	0	49
Hiking paths [km]	14	24	0	367
Employees in eating facilities	64	174	0	4'043
Number of cultural facilities	0.49	1.74	0	30
Number of baths in lakes	0.16	0.50	0	5
Number of outdoor pools	0.49	1.16	0	14
Number of outdoor tennis courts	0.41	0.83	0	9

4.3   Selection of personal and situational variables

The underlying utility function of discrete choice models distinguishes between variables characterising the destination (see 4.1), the travelling person and the actual situation. Each of these groups of variables is described separately, as relevant variables are identified based on former studies which have analysed factors influencing travel behaviour in general and destination choice in particular.

The demand data are not only used for describing the travellers, but also to restrict the data set. It was assumed that skiing trips were only carried out in the winter months (December, January, February, March), and trips for the summer activities in the summer months (June, July, August September), whereby only the defined subset of alternatives was allowed as destination. A further restriction refers to the kind of trip. Different leisure trip purposes were asked in the KEP, but only the categories 'excursion' and 'holiday' were considered in the following analyses.

4.3.1   Persons

The participation in a special activity is the result of humans trying to satisfy their needs and maximise the utility of their behaviour. But the behaviour is limited due to different constraints. These constraints can be distinguished for leisure activities in intrapersonal and structural constraints (Crawford, Jackson and Godbey, 1991). The intrapersonal constraints include personal skills and abilities, while the structural constraints include spatial, temporal or financial constraints. Gilbert and Hudson (2000) certified this theory for skiing participation and showed that the intrapersonal constraints are responsible for the question if a person goes skiing at all, while the structural constraints are more important for the choice of a destination.

Temporal and spatial constraints depend to a large extend on different socio-demographic factors. The variables age, gender, employment status, time budget, car-availability, income, number and age of children were found to be important for leisure travel (Lu and Pas, 1999; Zängler, 2000; Lücking and Meyrat-Schlee, 1994). Additionally, different studies – either based on empirical findings or on theoretical considerations – pointed out that the living situation (Fuhrer and Kaiser, 1994), general values and preferences (Götz, Jahn and Schultz, 1997), the social context and friends (Blinde and Schlich, 2000), previous journeys (Oppermann, 1991) and the level of information of travellers (Klassen, 2000) also influence travel behaviour. Unfortunately, the last mentioned factors are not available in the used database.

4.3.2   Travel situation

The situational variables are connected to each trip and change, if a person goes to another destination (unlike the personal variables) or if different persons go to the same destination (unlike the variables describing the destination). Possible situational variables are the travel situation, the weather, the season or the type of day. Because of data restrictions only the influence of the travel situation is tested here.

The most important variables to describe the travel situation are the generalised costs between the origin and the destination. They are a measure for the impedance to go from one place to another. The most common forms to incorporate the generalised costs into the utility function are the linear form and the log-linear form (Fotheringham, 1983). A linear function would imply that the utility decreases proportional to increasing generalised costs - regardless whether the generalised costs are already high or not. A log-linear form suggests instead that

the utility still decreases with increasing generalised costs, but the marginal utility decrease is lower for higher generalised costs.

The generalised costs were calculated with the software VISUM (© PTV AG, Karlsruhe). At this stage only the distances between two municipalities were considered, because the travel times between the municipalities are at the municipal level only available for the mode car, because not all municipalities have rail access. The shortest path - distances (time) were calculated using a national road network available at the IVT.

5. Results

Based on the theory and the preparations steps models for the three activity types could be estimated. Starting point of the estimations was a model including the mentioned spatial variables, the travel distances between origin and destination as well as variables describing the person. The last group of variables can not directly be integrated in the model, but must be used either alternative specific or in conjunction with a generic variable (Maier and Weiss, 1990). The second possibility was chosen because of the nature of the choice set (always different alternatives), whereby theoretical meaningful combinations were tested.

The selection of variables was not only based on theoretical considerations and the availability of variables, but also on the correlations between the variables. Because variables which are highly correlated can cause problems during the estimation process, pairs of variables with a correlation coefficient greater than 0.6 were tested in greater detail. Mostly the inclusion of both variables in one model was avoided.

This first models were modified according to the model results, whereby any modification was based on a-prior understanding and was not guided by the model results alone. The first attempts already showed some interesting results. On the hand, the person variables had very low, if any influence on the model results. So nearly all of them had to be omitted. The only exception was the ratio of inhabitants at the destination to the number of inhabitants at the origin. On the other hand the great importance of the distance variable became visible. So it seemed useful to present results with and without this variable. The log-linear function of the distance variable performed better than the linear function.

5.1   Model for skiing

The final model (see Table 4) consists of a variety of different variables and has a high quality, whereby the fit of the model with the distance variable is much higher than the fit of the other model. This means that the distance between origin and destination is able to explain 40% of the model's variability. Destinations further away are less interesting than nearby skiing resorts.

The choice of a destination is additionally influenced by variables describing the quality of the skiing resort and by variables exceeding the traditional skiing supply. Interesting is that the influence of the variables 'length of alpine tracks' and 'quality of alpine skiing area' is negative. This kind of relationship could also be seen in respective scatter plots. By way of contrast the influence of the price level, entertainment and other sport facilities is positive. Especially the availability of a public indoor pool and indoor tennis courts increase the attractiveness of a municipality.

Furthermore it is interesting to analyse how the change of a variable influences the choice of an alternative. An appropriate tool for doing this are elasticities which specify the proportional demand increase or decrease caused by an one-percent change in a variable. The elasticities were computed for four chosen variables. The results (see Table 5) confirm the importance of the distance variable.

Table 4   Coefficients, t-statistics and model fit of the skiing models

	Model with distance		Model without distance	
	Coefficient	t-statistics	Coefficient	t-statistics
Height of municipality [m]	0.002	6.298	-0.000	-2.556
Unvegetated or unproductive area [ha]	0.000	7.181	0.000	7.955
Employees in entertainment facilities	0.014	3.574	0.010	3.523
Inhabitants at destination/inh. at origin	-0.007	-2.743	-0.019	-4.971
Log of distance [km]	-2.429	-19.022		
Price for a ticket (one week)	0.004	1.791	0.003	2.261
Total length of alpine tracks	-0.001	-1.363	-0.002	-2.307
Quality of alpine skiing area	-0.182	-1.457	-0.143	-1.556
Quality of après-ski	0.217	2.711	0.191	3.243
Belonging to the skiing area	0.510	3.574	0.440	4.239
Number of public indoor tennis courts	1.025	7.075	0.750	6.855
Number of public indoor pools	0.269	6.961	0.261	8.949
Sample size (trips)		715		715
Log likelihood function (β)		-682.681		-1'298.842
ρ^2		0.585		0.211

Table 5   Elasticities for chosen variables of the skiing model

Alternatives	Distance	Price	Ski tracks	Indoor pool
Not chosen alternative	0.823	-0.525	0.111	-0.431
Chosen alternative	-1.589	0.380	-0.075	0.240

5.2   Model for climbing and hiking

As the model for skiing this model has a good model fit (see Table 6), but this is again mainly due to the high explanatory power of the distance variable. The model for climbing and hiking

contains variables describing the vegetation as well as variables describing the leisure infra-
structure. All infrastructural variables have a positive impact on the choice of a specific desti-
nation. Especially the possibility of swimming seems to attract people. The situation is differ-
ent in the case of the vegetation variables. Some of them have no significant effect (for exam-
ple area with closed forest), some of them a negative one (for example area with open forest),
some of them a positive one (for example area without vegetation).

Table 6   Coefficients, t-statistics and model fit of the climbing and hiking models

| | Model with distance | | Model without distance | |
	Coefficient	t-statistics	Coefficient	t-statistics
Height of municipality [m]	0.002	4.822	0.000	0.925
Area with open forest [ha]	-0.003	-2.116	-0.003	-4.187
Area with bushes [ha]	0.002	3.156	0.001	2.530
Area with copses [ha]	0.008	4.907	0.005	6.197
Area without vegetation [ha]	0.000	1.730	0.000	0.850
Area with meadows [ha]	-0.004	-4.378	-0.004	-6.775
Log of distance [km]	-2.181	-16.723		
Hiking paths [km]	0.004	1.605	0.005	3.733
Employees in eating facilities	0.010	2.046	0.001	4.711
Number of baths in lakes	0.770	2.577	0.415	2.627
Number of public outdoor pools	0.369	3.938	0.322	6.146
Sample size (trips)		570		570
Log likelihood function (β)		-266.422		-984.452
ρ^2		0.797		0.250

5.3   **Model for walking and swimming**

This model is the model with the highest ρ^2 compared to the others, whereby the differences
between the models are higher for the model type including the distance variable (see Table

7). This means that in the model for walking and swimming even more variability can be explained by the distance variable. The two models - with and without - do not only differ in the values of the ρ^2s, but also in the significance of the coefficients and even in the signs.

The choice of a destination is positively influenced by all variables describing the supply in a municipality. Especially swimming facilities attract people. Nearly as important as the possibility to swim is the possibility to walk. Cultural facilities also tends to increase the probability of a destination to be chosen.

Table 7   Coefficients, t-statistics and model fit of the walking and swimming models

	Model with distance		Model without distance	
	Coefficient	t-statistics	Coefficient	t-statistics
Number of inhabitants	0.000	-3.982	0.000	14.697
Area with closed forest [ha]	0.000	2.165	0.000	0.582
Area with parks [ha]	0.071	6.765	0.016	2.520
Inhabitants at destination/inh. at origin	-0.041	-4.071	-0.122	-13.749
Log(distance)	-2.001	-44.578		
Hiking paths [km]	0.015	8.177	0.008	7.822
Employees in eating facilities	0.001	4.402	-0.000	-0.085
Number of cultural facilities	0.060	2.712	0.0289	2.144
Number of baths in lakes	0.546	9.641	0.350	11.276
Number of outdoor pools	0.407	13.096	0.259	15.112
Sample size (trips)		3210		3210
Log likelihood function (β)		-1378.253		-5339.539
R^2		0.814		0.278

5.4   Interpretation

The low influence of the person variables on the model results support the statement of Gilbert an Hudson (2000) that the intrapersonal constraints are responsible for the question if a person carries out an activity at all, while the structural constraints are more important for the choice of a destination. Because only realised trips are regarded, differences in the socio-demography can not be seen. If a trip is carried out, the choice of a destination is mainly dependent on the destination specific characteristics.

The importance of the distance is another for all models valid result. It shows how sensitive people are to the distance they must travel. If the distance variable is omitted from the models, its influence is captured by other variables - sometimes leading to changes in the signs.

Besides these general findings each model contains further information

- **Skiing model**: One - perhaps surprising - result is that the availability of entertainment and additional sport facilities have a positive and greater impact on the choice of a destination than the skiing supply itself, but further functional forms need to be tested before this can be generalised.

- **Hiking and climbing model**: Whereas people clearly reward a good leisure infrastructure, there exist only trends with regard to the natural environment. Those vegetation types are interesting for people which are typical for alpine regions, for example areas without vegetation. Vegetation types, which can also be found in lower areas, are less appealing. This interpretation is supported by the fact that the height has a positive impact on the choice of a destination.

- **Walking and swimming**: Interesting in this model is the comparatively high explanatory power of the distance variable compared to the other models indicating that people are more distance sensitive for activities which more easily can be carried near the origin. A further finding is the importance of the infrastructure compared to the nature.

The unexpected results with regards to the skiing infrastructure and the general lack of explanatory power of the socio-demographic variables ask for further study. The heterogeneity of the persons can make point-estimates a difficult and potential misleading proposition. Mixed logit estimates (random parameter logit) will be performed in the future to account for these variabilities in taste between persons and contexts.

6. Conclusion

Modelling destination choice is at the moment a relative undeveloped area in transport modelling. But it is necessary to make progresses in this area, because leisure travel has become the most important trip purpose and the consequences of leisure travel are far reaching. The destinations themselves, especially small municipalities in the Alps, as well as municipalities on the main routes are often dominated by leisure travel. The carrying out of activities also has influence on the structure of municipalities.

Modelling destination choice requires suitable data sets and tools. Because the choice of a destination is a choice between discrete alternatives, one common form of discrete choice modelling - the MNL - was used here - knowing that not all particularities of destination choice can be captured and that further developments are desirable. But the results obtained give interesting hints on the relationships between the variables and the choice of a destination which are useful for planers and persons responsible for the supply in a municipality.

One main result of the models was that the choice of a destination is heavily influenced by the distance between origin and destination. Travellers weigh the attractiveness of a destination against the impedance between their origin and a potential alternative. This means that municipalities further away from the main cities must have a very attractive supply to attract people. Against this background the wish of many municipalities to have access to the main (road) network becomes understandable.

Most leisure activities require a respective infrastructure for carrying out them. For example skiing is not conceivable without lifts, walking is not conceivable without hiking paths. Therefore it is highly probable that a good infrastructure would be attractive for the potential users. In the case of skiing the initial model results do not support this hypothesis. The direct skiing infrastructure is not as important as other facilities - like a public indoor pool or aprés facilities - for the choice of a skiing resort. The length of ski tracks has even a negative impact. But at the same time the price of a ticket has a positive impact on the choice of destination - perhaps indicating the image of a skiing resort. However, in the case of walking the length of the hiking paths has a positive effect on the choice of a destination. But once again other facilities, like pools, possess a higher explanatory power.

In the skiing and walking model different types of infrastructural facilities determine the attractiveness of a municipality - of course dependent on the distance. The environment plays a

subordinate role. The situation is different in the case of hiking. Besides the infrastructure vegetation types which are typical for higher located municipalities tend to attract people.

To sum up - the model results show the importance of a good accessibility and varied infrastructure. What do these results mean for planners and sellers of tourist services. Is the conclusion admissible that a tourism dependent municipality can only survive if it continuously improve its supply and its access. To some extent this conclusion is right, especially because the competition between destinations is becoming fiercer. But it should also be kept in mind that a nation wide analysis has no place for smaller innovations. For example, a municipality like Ardez will never reach the visitor numbers of the world-famous St. Moritz, but it can be successful in attracting a specific type of tourists. So the results should not be understood as an excuse for further, but not well considered extensions of the tourist infrastructures.

7. Acknowledgements

8. Literature

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