THE ROLE OF CLIMATE INFORMATION IN TOURIST DESTINATION CHOICE DECISION-MAKING

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November 25, 2004

Working Paper FNU-56

Abstract

This study examines if tourists actively inform themselves about the climate of their planned destination. In addition, we examine where they inform themselves and at what point in the holiday decision-making process. A self-administered questionnaire was distributed to tourists at the airport, international bus station, and the train station in Hamburg during July and August 2004. Of the 394 respondents, 73% stated that they informed themselves about the climate of their destination. Moreover, the majority of them informed themselves about climate before booking (42%). Nevertheless, a large percentage of the tourists sampled state that they informed themselves shortly before their trip. Interestingly, a significantly large share of the respondents said that they checked the weather at their destination in the week before their trip.

Keywords

Tourist decision-making, destination image, information search, climate, weather

JEL Classification: Q26, Q54, D83

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1. Introduction

The impact of climate change on tourism has been examined quantitatively in several different ways. There are economic theory based studies that involve estimating the demand for destinations using, among other things, climate variables (see Maddison, 2001; Lise and Tol, 2002 and Hamilton, 2003). Related to these studies are global models of tourism flows that include temperature as a determinant of the flows of tourists between countries (Berritella et al., 2004 and Hamilton et al., 2003). There are also studies that use tourism climate indices to predict the effect of a changed climate on tourism demand (Scott and McBoyle, 2001 and Amelung and Viner, in press). The latter group of studies combine climate variables in a more complex way to reflect the thermal, physical, and aesthetic properties of climate. The former two groups take a more simplistic approach: they include temperature, and up to two other variables. How far does the reduction of climate to one or two variables limit these studies? Moreover, de Freitas (2003) argues that climate data expressed as an average, which is used in the economic studies mentioned above, has no psychological meaning. Nevertheless, the economic theory based studies and the global models base their analysis on the actual behaviour of tourists, in other words actual destination choices. A tourist's choice of destination will be based on what they expect from the chosen destination. Furthermore, what they expect will be driven by the image that they have of the destination. Of course, weather is not experienced as a set of separable and independent attributes but as a complex impression. In terms of climate, this leads us to ask: do tourists have an image of the climate and if so, how was this image formed? Moreover, it is unclear whether tourists form a complex picture of climate or if information on a few key attributes tells them enough about climate to construct an image. Lohmann and Kaim (1999), note that there is a lack of empirical evidence on the importance of climate on destination choice decision-making. In contrast to the German travel surveys reported by Lohmann and Kaim, we have focussed this study on climate image and climate information. As far as the authors of this chapter know, this is the first study of its kind and there is a considerable gap to be filled.

After considering the aforementioned issues, we formulated the following research questions:

A: How decisive is climate as a factor in decision-making?

B: At what point in the holiday decision-making process do tourists gather information about climate and weather?

C: What sources of climate information are most frequently used?

D: What are the most frequently used types of climate information?

In order to gather data to answer these questions, a survey of tourists departing from Hamburg and its vicinity was carried out during July and August 2004. The survey produced 394 completed self-administered questionnaires. The questionnaire provided details on the current holiday, destination image, information sources, type and presentation of information and demographic details of the respondents.

This chapter will continue in the second section with a review of the literature related to climate and tourism demand, tourist decision making and destination image and develops the hypotheses. The third section presents the research design. The results of the study are presented in section four. The fifth section discusses the implications and the limitations of this study and concludes.

2. Literature review and hypothesis formulation

Morley (1992) criticizes tourism demand studies, which typically focus purely on economic factors, because they do not consider utility in the decision making process.[1] Moreover, he suggests an alternative way to estimate demand based on the expected utility derived from the characteristics of the product – in this case the destination country is the product. Lancaster (1966) originally developed the concept that the characteristics of a good are more important to the consumer than the actual good itself. How these characteristics are perceived will determine the expected utility. In the case of tourism, the product is the holiday at a certain destination and at a certain time and this product will have certain characteristics. Knowledge of destination characteristics will be limited for a first time tourist. As climate can be temporally as well as spatially defined, even repeat visitors will not necessarily have experienced all seasons at the destination. Limits to knowledge lead Um and Crompton (1990) to argue that "the image and attitude dimensions of a place as a travel destination are likely to be critical elements in the destination choice process, irrespective of whether or not they are true representations of what the place has to offer" (Um and Crompton, 1990, p. 433).

The final choice of destination is the result of a decision-making process that involves the use of information, whether from personal experience or through an active search, to generate an image of the destination. This section develops the hypotheses related to destination image, decision-making and information search as well as climate information for tourists.

Destination image

There are many different definitions of what destination image actually is (Gallarza et al., 2002). There is however, a consensus that destination image plays an important role in destination choice. What role does climate play in destination image? Not all studies of destination image include climate as an image defining attribute, as can be seen in the extensive review of destination image studies by Gallarza et al. (2002). Of the 25 destination image studies reviewed, climate was included as an attribute in 12 studies. Nevertheless, from their list of 20 attributes, climate is the seventh most frequently used attribute. Studies of destination image, that include climate/weather as an attribute, find that it is one of the most important attributes. There are, however, differences in the preferences shown by different types of tourists and for tourists from different places (Hu and Ritchie, 1993; Shoemaker, 1994; Kozak, 2002 and Beerli and Martin, 2004).

Only one of the 142 destination image papers reviewed by Pike (2002) specifically deals with weather. This was a study by Lohmann and Kaim (1999), who assess, using a representative survey of German citizens, the importance of certain destination characteristics. Landscape was found to be the most important aspect even before price considerations. Weather and bio-climate were ranked third and eighth respectively for all destinations. Moreover, they found that although weather is an important factor, destinations are also chosen in spite of the likely bad weather. In a study by Gössling et al. (2005) of tourists surveyed in Zanzibar, tourists were asked to rate climate's importance for their decision to travel to Zanzibar. More than half rated climate important but a small share of the respondents (17%) stated that climate was not important at all. Based on the existing literature, it seems that climate is an important factor for tourists when choosing their holiday destination. We have, therefore, formulated the following hypothesis:

Hypothesis A1: Destination climate is an important consideration for the choice of destination.

Decision-making and information search

Fridgen (1984) expands on the five-phase model of recreation behaviour of Clawson and Knetsch (1966). The five phases are anticipation, travel to the site, on site behaviour, return travel and recollection of the trip. The anticipation phase includes decision-making and preparation for the holiday. According to Fridgen (1984), tourism decision-making involves environmental preferences and the cognitive image of what they expect from the destination. Other models of decision-making in the tourism literature contain a number of stages. Among these stages may be the motivation to go on holiday, information gathering and evaluation of

the holiday, which may include feedback loops into the next holiday decision (see for example Van Raaij, 1986; Gunn, 1989; Ahmed, 1991; and Mansfeld, 1992). The temporal aspect of the holiday decision, in other words when to go on holiday, is absent from these models of decision-making. Sirakaya and Woodside (in press) distinguish between behavioural and choice set approaches to decision-making. According to them, behavioural approaches seek to identify the different stages in the decision-making process and the factors that influence the process. Choice set approaches involve identifying the various destinations that are in the awareness set and following an active information search, an evoked set develops (see, for example, Um and Crompton, 1990). From the latter set, the final destination will be chosen. In both of these models the tourist assesses the destination options available, using information acquired from their search and gradually eliminate the options that do not meet their needs. In both cases and in the studies discussed above, information is gathered in order to make the decision. Hence, we formulate our hypothesis as:

Hypothesis B1: Tourists gather climate information before they make their concrete holiday decision.

Information on the current weather at the destination or predictions for the weather in the coming week can only be used to make decisions about destination choice at the very last minute. Therefore, we assume that the tourist gathers weather information in order to prepare for their holiday and make any necessary adjustments to the clothing or equipment that they will take with them. They may also do so to adjust their image according to the current situation and so modify their expectations. This leads to the following hypothesis:

Hypothesis B2: Tourists gather weather information in preparation for their holiday.

Closely related to the time of information gathering is the question of which information sources are used. The destination image studies that take climate and weather in to account do not consider this factor, whereas another group of studies focus on information search strategies but do not specifically look at climate information. Three distinct information search strategies are classified by Fodness and Murray (1998 and 1999). First, there is a spatial element; the information search can occur internally, that is information from the individual's own memory, or it can occur externally, through the acquisition of information from sources such as travel agents or friends and family. Second, there is a temporal element to the information search. Tourists may continually be gathering information for their holiday or they may do so only when they are planning to go on holiday. The third aspect of the

search is operational, which reflects the type and number of sources used. In a survey of American tourists who travelled to Florida, 68% of the tourists used more than one source in their information search (Fodness and Murray, 1998 and 1999). The sources most likely to be used on their own were: personal experience, travel agencies, and friends and relatives. For a repeat visit, which involves less complex problem solving than a first time visit, Fodness and Murray (1999) argue that personal experience will be favoured. In their results, however, an external source of information - friends and relatives - was the main source. For those with a longer decision period, possibly reflecting a first time visit, friends and relatives is also the main source followed by auto club and travel agent. This study uses the length of planning period but the actual type of decision, that is whether it was a first time visit or a repeat visit, is not made explicit. Van Raaij (1986) argues that novel destination possibilities and expensive holidays will necessitate an extensive information search. As the following analysis concerns itself with international tourism trips, the holidays under consideration are likely to be one of the major purchases by a household. Not only this, a holiday abroad is a significant event. Therefore, we can assume that the majority of the tourists will use several different information sources. Four information source categories were examined by Baloglu and McCleary (1999). These were professional advice, word of mouth, advertisements, books/movies/news. Word of mouth was ranked highest in terms of its importance for forming an image of the destination. The least important category was advertisements. In addition, they find that the mean number of sources used in their sample to be 3.75. In a study on the destination image of India, tourists used several different information sources. Friends and relations was the main source for more than half of the tourists (Chaudhary, 2000). From the above, we have formulated the following hypotheses.

Hypothesis C1: Tourists rely on more than one information source.

Hypothesis C2: 'Friends and family' is the dominant information source category for first time visitors.

Hypothesis C3:'Own experience' is the dominant category for repeat visitors.

Climate information

Types of climate information can be examined in terms of content as well as presentation. De Freitas (2003) classifies climate according to its aesthetic, physical and thermal aspects. The thermal aspect is argued to be a composite of temperature, wind, humidity and radiation. Since climate is complex, we assume tourists are striving for a detailed picture in their information search and therefore formulate the hypothesis as:

Hypothesis D1: Tourists gather climate information on several different attribute types.

The studies that analyse the demand for destinations in terms of characteristics include variables for temperature and in some cases precipitation and the number of wet days in the demand function (see Loomis and Crespi, 1999; Mendelsohn and Markowski, 1999; Maddison, 2001; Lise and Tol, 2002; Hamilton, 2003; Berritellla et al. 2004 and Hamilton et al. 2003). Moreover, in the studies that use tourism indices, such as Scott and McBoyle (2001) or Amelung and Viner (in press), temperature plays a greater role than any other climate variable. The tourism climate index, developed with regard to the biometeorological literature on human comfort, consists of five sub-indices. The sub-indices contain seven climate variables, three of which are temperature ones (mean, maximum and minimum temperature). The two sub-indices that contain the various temperature variables account for 50% of the weighting in the tourism climate index. As temperature is an important factor in both behavioural and biometerological studies of tourism and climate, we have formulated the following hypothesis:

Hypothesis D2: Temperature is the dominant attribute for climate information.

We found little guidelines in the literature on the way that climate information is portrayed. De Freitas (2003) argues that a climate index would be the most appropriate way to present climate information to tourists. Nevertheless, the authors are not aware of actual studies where the preferences of tourists for different formats are tested. From a survey of the Internet and print sources of climate information, we can conclude that there are many different ways of presenting such information. There was, however, no clear tendency towards a particular presentation form. For this reason we randomly chose one of the possibilities for our hypothesis, which we have formulated as:

Hypothesis D3: Tourists prefer a textual format for the presentation of climate information.

The nine hypotheses and the related research questions are shown in figure 1. This figure depicts the phases of potential image change indicated by the various grey shades. The tourist has an image before planning that may change during the actual planning process and even after the decision for a specific destination has been made. Although not examined in this paper, the tourist's image could also change after the experience of the holiday.

3. Research Design

The fact that this study includes not only the question of information sources and information types but emphasizes the time of information gathering lead us to choose a specific point in time to survey tourists – shortly before departure. This allowed us to include the phase of preparation for the travel. Our study population are those residents of Germany going on an outbound holiday and departing from Hamburg and its vicinity. Our sampling frame consists of those tourists departing from Hamburg and its vicinity at specific points of departure: the airport, the train station,[2] the international bus terminal and the harbours of Travemünde and Kiel for ferries to Scandinavia.[3] Our convenience sample consists of those tourists travelling on the selected days and on the selected departures. All participants were aged 16 or over and resident in Germany. Additionally, only one person out of a travel party was questioned. We purposefully excluded business travellers in the sample used.

We paid attention to the following quotas:

1) Destination countries according to the market shares from the Reiseanalyse (F.U.R, 1998 and 2004)

2) Transportation mode market shares also from the Reiseanalyse (F.U.R, 1998 and 2004)

The survey was carried out on 20 days spread over the months of July and August 2004. The days and times of the survey were chosen to correspond with departures to the countries with a high quota. The study period covered the main parts of the local school holidays.[4] The schedule and budget of this study did not allow for an inclusion of car travellers according to the market share of about one third of all travellers. Therefore, this group was left for future research. The quotas, therefore, corresponded to the relative market shares of the other transport modes.

While creating the questionnaire, we consulted a group of specialists, who commented on the preliminary versions of the questionnaire. These were tourism experts from academia as well as professionals from the tourism industry and others from the fields of marketing and quantitative research. A two-step pilot study was carried out at the end of June with the target group of tourists leaving from Hamburg Airport and a group of randomly chosen students. This pilot phase yielded valuable insights into intelligibility for the final questionnaire version. The comments of the experts and the results of the pilot phase resulted in the reformulation of individual questions and the questionnaire to improve its intelligibility.

In the following, we give an overview of the relevant questions from the questionnaire that we use in this analysis. The first section of the questionnaire includes general questions on the holiday: the destination country, the length of stay and the organizational form of the trip. We largely oriented this section on the Reiseanalyse (FUR, 1998 and 2004) in order to guarantee comparability to other studies. As far as possible, these questions are in multiple-choice format. Another section contains two questions that identify the main image attributes and the main information sources. See table 1 for details of the sources used to formulate these questions. The next section begins with a filter question about whether the tourist had been to the destination country before. Answered positively, the respondents are asked to complete five additional questions. After that another filter question is asked; if the respondent had informed themselves about the climate of their destination. If answered positively, another block of five questions follows. The questionnaire closes with a section containing demographic questions that provide details on the respondent's place of residence, gender, age, and education level.

Hypothesis A.1

This hypothesis will be tested by examining if climate is at least the third most important attribute for the choice of destination. In order to assess this we asked respondents to rank the three most important attributes out of ten attributes. The ten attributes were chosen according to an analysis of the attributes that were found to be the most important[5] for tourists in studies on destination image (see table 1 for the sources used). We purposefully put this ranking question on the first page of the questionnaire. Respondents were not told in advance the specific focus of the questionnaire. This way the individual's perception on the importance of climate was assessed before the respondent became aware of climate being the main theme of the questionnaire.

Our assumption that climate information is indeed important within the decision-making process purposefully does not implicate a certain quality of climate, e.g. as Baloglu and Mangaloglu (2001) do when using the attribute of 'good climate'. Although this could mean either a good climate according to the individual's perception or a good climate for certain activities that the tourist prefers to undertake while on holiday, such a formulation may yield a pre-valuation of the climate factor. We assume that some tourists will search for warmer places to go, others may prefer a cooler climate than they experience in their home region at the same time of the year and some may be completely indifferent. Moreover, the individual's

perception of the climate at the destination as being 'good' may be influenced by the home weather at the time of booking. In the region of Hamburg, where the survey has been undertaken, the summer 2004 has been widely perceived as comparatively cold and wet. In order to hold this sort of seasonal deviation at a minimum, we focus on climate and do not value it.

Hypotheses B1 and B2

Motivated by the decision phases formulated in studies of Fridgen (1984), Ahmed (1991) Mansfeld (1992), we emphasize three distinct phases of information gathering. The first phase is limited to the time before the tourist decides to go on holiday. It is not an active information gathering phase, since an image of the climate of the destination is there already either through previous experience in the country (or comparable climatic regions) or through knowledge gained from a general interest in the area. Phase 2 covers the period after the tourist is motivated to go on holiday but has not made the concrete decision of where and when. In this phase, information will be actively gathered in order to make these decisions. Phase 3 includes information gathering in preparation for the holiday. This is carried out after the decision has been made but before the actual trip.

The hypotheses B1 and B2 are tested using the results of two questions. The first question asks the tourists to state when they informed themselves about climate. There were seven options, which belonged to the following three groups: *before planning, during planning* and *after the decision,* which correspond to the phases 1 to 3 respectively. We gave the tourists the opportunity to choose more than one option. The second question concerns the actual weather at the destination before the trip: we ask the tourists whether they have been following the weather during the week before their holiday.

Pinpointing the time at which information is gathered also contributes to the analysis of the climate as an important factor in decision-making (see hypothesis A1). Information gathering *during planning* indicates a decisive character, while *after the decision* indicates for instance an adaptation of clothing to the climate and does not play an important role in the decision to go to the destination.

Hypotheses C1, C2 and C3

We included a question on the sources of information about the destination in general. Information sources for general information on a destination may be different from the sources used for climate information. From the review of the studies shown in table 1, we

included 12 possible sources of information, including *friends and family* and *own experience* as well as weather information providers. The latter was included not only because of the purpose of this study but also because such sites contain information about destinations and links to online travel agents, tour operators and airlines.
In order to test the hypotheses, the exact same sources were included in a question specifically focusing on climate. We asked the tourists to rate on a five point Likert scale, the actual information sources used according to the importance for the decision. The filter question on previous visits is used to establish the two groups of first time and repeat visitors.

Hypotheses D1, D2 and D3
In these hypotheses, we distinguish between the presentation of the information and the content of the information. An examination of the possible sources of destination information and destination climate information resulted in the inclusion of the following categories: text format, maps, diagrams and numerical data (see table 1 for the sources). The various information sources provide on different types of climate information, these range from several temperature types to precipitation related information and less frequently mentioned attributes such as humidity or UV-radiation.

4. Analysis
General results
Not all of the tourists asked to participate in the survey agreed to take part. The response rate differed in two ways, first between the two months and second according to the departure point where the survey was carried out. Generally, July showed a better response rate (of 2:1 and even better) than August. The response rate at the airport was altogether less high than at the bus terminal, train station or ferry terminal. At the airport, the terminals seemed to matter. The survey was easier to carry out in the charter flight terminal, where we had a response rate of 3:1 during August, whereas at the terminal for scheduled flights, on some survey days, we had a response rate of 10:1. In total, we had 413 returned questionnaires. We eliminated 19 questionnaires because core questions were unanswered and so we coded 394 questionnaires in total.
Table 2 shows the demographic profile of the tourists surveyed. Compared to the age structure from the Reiseanalyse data from 1998 (F.U.R, 1998), this survey has a more distinctive bi-modal pattern, which can be seen by the larger shares of tourists in the 20-29 and 40-49 age groups and a much smaller percentage in the 30-39 age group. The male/female split

corresponds to that of the current population of Germany. Compared to the Reiseanalyse from 1998, this survey has a much larger share of those with a degree or who have a university entrance diploma. A comparison with national statistics is difficult because the statistics cover the age group 25-64 and statistics are based on completed years of education and include technical qualifications, which are not included in our options.

Questions were also asked about the current holiday, the results of which are presented in table 3. The average length of the holiday is 14.3 days, which corresponds to the average length of holiday (13.7 days) reported for the Reiseanalyse 2004 (F.U.R; 2004). Surprisingly, a large share of the holidays were organised independently.[6] The shares for package tours and booking through a travel agent are similar to that of international trips in the Reiseanalyse 2004. As mentioned above, quotas had been used to get a representative spread of holidays to the most popular countries for German tourists. Nevertheless, an important group of tourists, those travelling to their destination by car, could not be included. Countries that are very popular but are typically travelled to by car: Austria, Switzerland, Poland, Denmark and the Netherlands, are underrepresented in the survey. In addition, the share of long-haul trips is smaller than that of the Reiseanalyse 2004. We must take into consideration however that the Reiseanalyse covers a whole year. This study concentrates on the summer and it is logical that there would be less of a tendency to travel far, when Europe is at its most attractive climatically. Finally, the majority of respondents had visited their destination previously.

Research question A: climate as a factor in decision-making

The tourists were asked to pick the three attributes from a list of ten that were most important in their decision to go to the destination, and rank them. 94% of the respondents provided a useable ranking of the attributes. From table 4, we can see that only two attributes are chosen more often than they are not chosen, namely climate and access to the sea/lakes. Not only was climate the most frequently chosen attribute, it also achieves the highest ranking of all attributes. The t-test for related samples was used to test if the mean rank value of climate is significantly different from that of sea/lakes, culture/history and nature/landscape, the three attributes closest in popularity to climate. Table 5 presents the results of this test and we can see that the mean of climate is significantly different from the other three attributes. For that reason, we can accept our hypothesis that climate is at least the third most popular attribute. Moreover, we can say that it is the most popular for the tourists in our survey.

Almost two thirds of the respondents said that they had informed themselves about climate before their holiday. A further 10% answered the questions on climate information, even

though they said that they did not inform themselves about climate or did not give any answer to the question.

Research question B: Decision-making process and information search

There were seven options, which we converted into three stages: *before planning the holiday, during the planning and after the decision* has been made to go to the destination. The most common phase for gathering information about climate is during the planning stage (42%). Nevertheless, "shortly before the holiday" was the most frequently chosen single category (34%) and for those that only chose one category, the split between the three phases, *before planning*, *during planning* and *after the decision* is 25%, 35% and 39% respectively. The majority stated only one phase where they gathered climate information. Of the tourists that combined two or more options, 61% combined the phases *during planning* and *after the decision*. We can accept the hypothesis B1 that tourists gather climate information before they make their decision but with the caveat that the group of tourists informing themselves after the decision is also considerable.

In addition to the results presented above, we examined whether the respondents had been following the weather at their destination during the week before their departure. The majority of respondents (59%) had been following the weather of the week before their departure. Table 6 shows the cross-tabulations of this variable and the groups *before planning, during planning* and *after decision.* The correlations are not significant. It seems that there is no relationship between when the tourists inform themselves about climate and whether they follow the weather. Nevertheless, the relationship between getting climate information and following the weather in the week previous to travel is significant. If tourists inform themselves about climate, they also inform themselves about the weather shortly before they travel. We can accept the hypothesis B2 that tourists gather weather information before they travel, as the majority of tourists do this. Nevertheless, we accept this hypothesis with the caveat that a large group of tourists (41%) showed no interest in weather. An examination of different tourists groups and destinations could provide more information on what conditions make weather and climate information important for the tourist.

Research question C: Sources of climate information

The results of the question on information sources are problematic. Tourists were asked to rate 12 different information sources and a thirteenth option of "other" on a scale of one to

five for only those sources that they used. The question was answered in two different ways: first, that only the actual sources used were given a rank and second, that all sources were given a rank. For the following analysis, we have examined these two groups separately. The first group, those that ranked only the sources that were used, we will call group A. The second group, B, are those that ranked more than ten sources. Table 7 shows the number of climate information sources used. The first column contains the number of sources used by group A. The second column contains the number of sources used, for group B, when we exclude those that are ranked lowest. In both cases, we can accept the hypothesis C1 that more than one source is used, given that 21% (A) or 7% (B) of the respondents state only one source. For comparison, the number of sources used as information about the destination is shown. Here there is a greater reliance on only one source (45%).

For the first time visitors of group A, friends and family and travel guides are the most frequently chosen sources with 51% each (more than one response was possible). The second most important sources are travel agent and tour operator. For the group of repeat visitors of group A, own experience was chosen by 69% of the respondents followed by friends and family (53%) and travel guides (40%). An examination like this is difficult for group B as they rank (almost) all of the sources. From this preliminary analysis, it seems that we can accept our hypothesis C2 that for first time visitors family and friends is the most important source and the hypothesis C3 that for repeat visitors own experience is the most important source. Nonetheless, a more detailed analysis is needed. Table 8, shows the cross-tabulations of previous visit (yes/no) with the sources family and friends (yes/no) and with own experience (yes/no), for the sources of information about the destination in general (for all tourists) and about the climate for the groups A and B. For destination information and for climate information (group A), there is no statistically significant effect of being a first time visitor on the tourists' likelihood to get information from family and friends**.** For group B, the effect is significant but counter intuitive. Having visited the destination before has the effect that you are more likely to ask family and friends about the climate. The results are much clearer for own experience. The positive relationship between previous visit and own experience is significant for all groups.

Not only can we examine the most frequently chosen sources, we can also look at the mean of importance value attached to them. There are no statistically significant differences in the means of own experience and family and friends for groups A and B. There are, however, differences in the means, if we examine the groups of repeat and first time visitors separately. For group A, there are few first time visitors, who used both sources. This makes a

comparison of the means difficult, so we will continue with the repeat visitors. For that group, we have a mean difference of -0.4828 between friends and family and own experience, which is significant at the 5% level. Not only is own experience relied on by more tourists it also is more important. For the first time visitors of group B, friends and family has a higher mean value than own experience and is statistically significant at the 10% level. Again, for the repeat visitors, we see a significant difference in the means and own experience is ranked the more important of the two sources. Other sources that were given a high rank were newspapers and television, travel guides and weather information providers.

Research question D: Types of climate information

An overwhelming majority of the respondents (91%) chose more than one climate attribute. The mean number of attributes chosen is 3.23. We can therefore accept the hypothesis D1 that tourists choose more than one attribute.

In table 9, we can see that temperature is quite clearly the most frequently chosen attribute. Maximum temperature was chosen by two thirds of the respondents. 32% and 16% of the respondents chose average and minimum air temperature respectively. Other attributes that were chosen by more than half of the respondents were the number of rainy days, duration of sunshine and water temperature. As respondents were able to chose more than one attribute, we present the frequencies with which the air temperature attributes were chosen both singularly and in combination. As the lower half of table 9 shows, only 12% of the respondents did not chose one of the air temperature attributes. This gives very clear support for hypothesis D2, that temperature is the dominant attribute.

From the 5 possibilities offered, textual format was the second least preferred option and if we discount the option “other” then it is the least preferred. In this case, we can reject the hypothesis D3 that tourists prefer a textual format. Table 10 shows the results for all options in two forms: for all respondents and for those only giving one response. In both cases, numerical data is the most popular option.

5. Discussion and conclusion

This study adds to the evidence that climate is an important factor in destination choice. In addition, it provides clarity over the role of climate and weather information gathering in the various phases of the decision-making process.

Our results highlight the importance of information gathering before making a decision. Furthermore, this study shows that information gathering also occurs after the decision. The

number of sources used by the tourists is comparable with other studies (Van Raaij, 1986; Fodness and Murray, 1998 and 1999; Baloglu and McCleary, 1999 and Chaudhary, 2000). Moreover, this study gives support for Fodness and Murray's theory (1999) that personal experience will be the main source of information for repeat visitors. The importance of friends and family as an information source for all of the tourists in our sample, reflects the results of Chaudhary (2000). The majority of tourists informed themselves about climate from a variety of sources. Therefore, the results of this study could also be useful for the providers of tourism information, in that they tailor the information they present to meet the preferences of tourists.

There has been some debate on the effectiveness of using tourism climate indices and demand studies to assess the impact of climate change on tourism. Studies of destination demand have been criticised of simplistically representing climate using single variables, such as temperature and precipitation and not a complex of variables. The results presented in this study support the use of temperature as the main determining variable in destination demand studies. Nevertheless, we cannot claim from these results that temperature alone is enough to represent the considerations of tourists about destination climate. We do not find support for de Freitas' argument (2003) that data presented as averages have no psychological meaning. Travel guides typically present climate data as monthly averages and they were, along with family and friends, the most frequently used source for first time visitors.

The limitations of this study need to be addressed. A major issue is that of the sample used. Time and budget considerations limited the study to easily accessible departure points. As tourists travelling by car have no common departure point, we had to omit them from our sample. This had the consequence that certain destinations, such as Italy, Denmark, the Netherlands and Austria were underrepresented. Nevertheless, climatically comparable destinations were well represented. It is unclear if different information search strategies are related to particular travel mode choices. In addition, a non-random sampling method was used, which limits the generability of the results. The survey period encompassed the school holidays of the states of northern Germany. This peak holiday period can easily be avoided by other groups of tourists who are not tied to institutional holidays. Therefore, the study may be biased towards tourists travelling with children. From other survey sources, it can be seen that older travellers favour the off-peak months (for example Oppermann, 1995). Despite two pilot studies, certain questions were not formulated clear enough, which hindered the analysis (see

the results for research question C). An interview methodology may be better to examine such complex issues but this would be expensive and time consuming on this scale. Instead of using a self-administered questionnaire, verbally administering the questionnaire could bring more success.

Although they have quite different definitions, the terms weather and climate are used interchangeably by the general public. This can also be seen in some of the images studies that refer to weather, even though what is actually meant is climate. We tried to be clear and distinguish between weather and climate in our survey. Nevertheless, in some questions it is possible that the respondents misunderstand and give responses in terms of weather information. This is particularly the case with climate information sources, where some of the sources listed can give information on past weather, the climate, current weather and predicted weather. For example, the weather information providers, which have information on all four or family and friends, who may also be able to provide information on all four. Again a verbally administered questionnaire could be more effective.

Global climate change is already having an effect on mean temperature and its further course is very likely to have an impact on the tourism industry as well. As the results of this study showed, climate is a defining factor for the destination choice of tourists. When the climate changes, destinations' attractiveness will change and with it – probably with a considerable time lag – also tourists' images of the destinations. An ancillary effect of global warming is that of sea-level rise. Access to the sea will change considerably and the quality of beaches will mostly deteriorate, with intensified erosion and change of slope occuring. As this study shows that the access to sea and lakes is the second most important attribute to tourists when choosing a destination, sea-level rise will have a large effect on the tourism industry, as tourists will not necessarily adopt to the new situation by changing their preferences, they would rather change destinations.

Having carried out this survey, the first of its kind to focus on climate as a specific attribute of destination image and on its role in the decision-making process, we have produced a valuable database that can be used for further research. For instance, the issue of whether the tourists' images of climate are accurate when compared to the climate of their destination can be assessed (Um and Crompton, 1990). Some destination image studies found that there were differences in image for different groups of tourists (Shoemaker, 1994 and Kozak, 2002). It

would be an interesting extension of this study to examine, whether we find different information preferences for different demographic or holiday groups.

Acknowledgements

The CEC DG Research through the DINAS-Coast project (EVK2-2000-22024) provided welcome financial support. We are grateful for the assistance and enthusiasm of Petia Staykova, Christian Röbcke and Aydin Nasseri. All errors and opinions are ours

[1] For an extensive review of tourism demand studies see Witt and Witt (1995) and Lim (1995).
[2] We chose car-train departures to southern Europe from the station Hamburg-Altona. This gave us direct access to tourists travelling abroad by train, whereas with the normal international trains it would have taken a lot of time to locate the international travellers as domestic travellers also use the international trains.
[3] There are no international ferries departing directly from Hamburg.
[4] The six-week long school holidays of the states of Hamburg, Schleswig-Holstein and Mecklenburg-Pomerania were partly covered by the study period. For the states of Bremen and Lower Saxony, the school holidays coincided with the study period.
[5] We took the five highest valued attributes from each study and calculated the frequency that each attribute appeared over all the studies. The ten most frequent were then taken from this list.
[6] The Reiseanalyse (F.U.R; 2004) examines direct booking with the providers of accommodation, whereas our "individual" category includes both transfer and accommodation.

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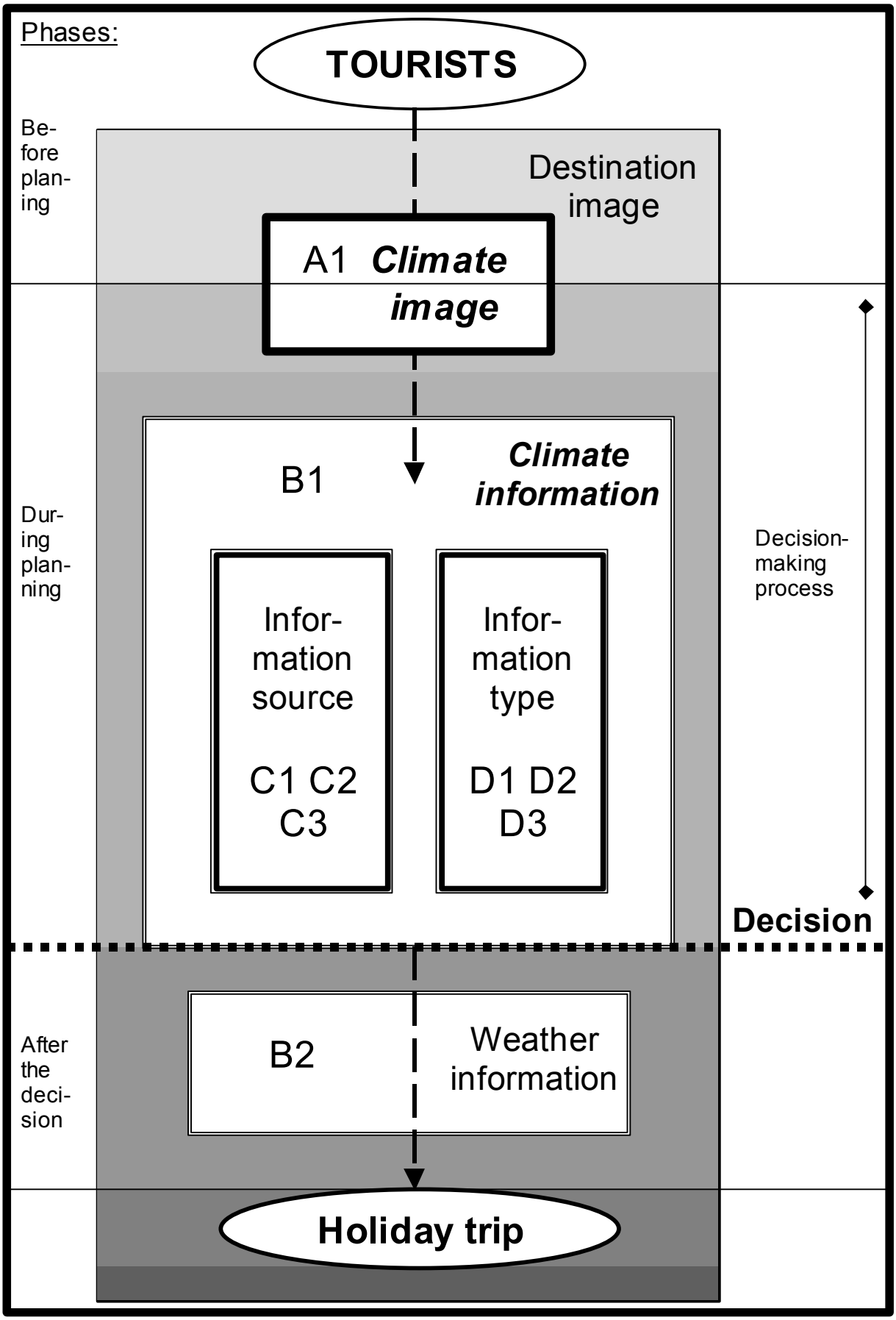

Figure 1 Conceptual model with hypotheses of the role of climate information in the tourist decision-making process

Tested attributes	Source of attributes
Destination image	Baloglu and Mangaloglu (2001), Baloglu and McCleary (1999), Kozak (2002), Lohmann and Kaim (1999), Gallarza et al. (2002), Hu and Ritchie (1993) and Yuan and McDonald (1990)
Information sources	Baloglu and McCleary (1999), Chaudhary (2000), Fodness and Murray (1999) and Phelps (1986)
Type and presentation of information	own research of online weather information providers, online travel guides, information provided online by travel agents, tour operators, foreign offices and tourist boards, and print travel guides
General information on the trip and demographic information	F.U.R (1998 and 2004)

Table 1 Sources of attributes for the questionnaire

	Mean	Frequency
Age (n=377)	40.3	
16-19		9.0%
20-29		28.9%
30-39		18.3%
40-49		21.5%
50-59		10.1%
60-69		11.4%
70-79		0.8%
Gender (n= 387)		
Male		48.8%
Female		51.2%
Place of residence (n=362)		
Hamburg		34.5%
Northern Germany		51.7%
Other within Germany		13.8%
Education (n=378)		
Completion of compulsory education		40.2%
University entrance diploma		27.5%
Higher education		31.7%
No qualifications		0.5%

Table 2 Descriptive profile of respondents (n=394)

		Mean	Frequency
Duration of stay (n=388)	in days	14.3	
Less than one week			14.4%
One week			17.5%
One to two weeks			19.1%
Two weeks			27.1%
Two to three weeks			9.8%
Three weeks			4.9%
Three to four weeks			1.0%
Four weeks and more			6.2%
Holiday organisation (n=393)			
Independent			42.5%
Travel agents (but not a package tour)			20.6%
Package tour			32.3%
Other			4.6%
Destination (n=394)			
Spain			25.4%
Greece			8.9%
France			7.1%
Italy			6.3%
Croatia			5.3%
Hungary			5.3%
Turkey			5.3%
Bulgaria			3.8%
Sweden			3.8%
Tunisia			3.8%
Other European			20.1%
Other non-European			4.8%
Previous visit to the destination (n=391)			
No			36.8%
Yes			58.6%
No response but answered the follow up questions			4.6%

Table 3 Descriptive profile of holidays (n=394)

	1st position value = 3	2nd position value = 2	3rd position value = 1	Not chosen value = 0	Total Chosen	Mean
Access to the sea/lakes	53	79	56	182	188	1.01
Accomodation	14	33	22	301	69	0.35
Climate	**91**	**65**	**40**	**174**	**196**	**1.20**
Cuisine	2	12	10	346	24	0.11
Cultural/historical attractions	60	50	33	227	143	0.85
Ease of access	3	22	23	322	48	0.21
Hospitality	17	38	35	280	90	0.44
Nature/Landscape	62	58	36	214	156	0.91
Price	17	61	48	244	126	0.60
Sport and leisure activities	8	22	19	321	49	0.24

Table 4 Results of the ranking of destination attributes (n= 370)

	Mean	T-value	2-Tail sig.
Climate and Nature/Landscape	0.28	2.701	0.007
Climate and Access to the sea/lakes	0.19	2.228	0.027
Climate and Cultural/historical attractions	0.35	3.242	0.001

Table 5 Mean differences between destination attribute rank values (n= 370)

			Yes	No	
			Climate information gathered		
	Yes		68%	33%	
	No		33%	67%	
		N	286		91
			Climate information before planning		
Respondent was aware of the weather at their destination during the week before their holiday	Yes		71%	68%	
	No		29%	33%	
		N	68		206
			Climate information during planning		
	Yes		70%	67%	
	No		30%	33%	
		N	133		141
			Climate information after the decision		
	Yes		68%	68%	
	No		32%	32%	
		N	132		142

Table 6 Cross-tabulations of climate information and the weather in the week before the holiday

	Climate-Group A	Climate-Group B	Destination
1	21%	7%	45%
2	24%	6%	28%
3	24%	20%	17%
4	17%	19%	8%
5	4%	10%	2%
6	4%	17%	<1%
7	<2%	9%	<1%
8	<2%	14%	
9	<2%	7%	
10	2%	8%	
11		4%	
12		6%	
13		2%	
N	141	138	392

Table 7 Number of information sources used

		Previous visit	
		Yes	No
Sources of information about the destination			
Family and friends	Yes	38.5%	41%
	No	61.5%	59%
	N	247	145
Own experience	Yes	53%	2%
	No	47%	98%
	N	247	145
Sources of climate information (group A)			
Family and friends	Yes	49%	57%
	No	51%	43%
	N	92	47
Own experience	Yes	65%	6%
	No	35%	94%
	N	91	47
Sources of climate information (group B)			
Family and friends	Yes	71%	51%
	No	29%	49%
	N	83	53
Own experience	Yes	85%	36%
	No	15%	64%
	N	85	50

Table 8 Cross-tabulations of information sources and the weather and having visited the destination previously

	Mean	Frequency
Number of attributes chosen	3.23	
Climate attributes chosen		
Maximum temperature		67%
Water temperature		52%
Duration of sunshine		51%
Number of rainy days		50%
Average temperature		32%
Minimum temperature		16%
Amount of precipitation		16%
Humidity		14%
Cloudiness		10%
Wind conditions		7%
UV Radiation		6%
None of these		3%
Air temperature options chosen		
Maximum temperature		27%
Average temperature		19%
Minimum temperature		1%
Maximum and minimum		8%
Maximum and average		25%
Average and minimum		<1%
Maximum, minimum and average		6%
Did not choose any temperature option		12%
N	283	

Table 9 Preferences for information about climate attributes

	Frequency	
	more than one response	only one response
Maps and satellite images	33%	23%
Text	27%	15%
Diagrams	36%	17%
Numerical data	57%	42%
Other	2%	3%
N	283	149

Table 10 Preferences for the presentation of information about climate attributes

Working Papers

Research Unit Sustainability and Global Change

Hamburg University and Centre for Marine and Atmospheric Science

Hamilton, J.M. and M.A. Lau (2004) *The role of climate information in tourist destination choice decision-making,* **FNU-56** (submitted)

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Susandi, A. and R.S.J. Tol (2004), *Impact of international emission reduction on energy and forestry sector of Indonesia*, **FNU-53** (submitted)

Hamilton, J.M. and R.S.J. Tol (2004), The Impact of Climate Change on Tourism and Recreation, **FNU-52** (submitted)

Schneider, U.A. (2004), *Land Use Decision Modelling with Soil Status Dependent Emission Rates*, **FNU-51** (submitted)

Link, P.M., U.A. Schneider and R.S.J. Tol (2004), *Economic impacts of changes in fish population dynamics: the role of the fishermen's harvesting strategies*, **FNU-50** (submitted)

Berritella, M., A. Bigano, R. Roson and R.S.J. Tol (2004), *A General Equilibrium Analysis of Climate Change Impacts on Tourism*, **FNU-49** (submitted)

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Rehdanz, K. and Tol, R.S.J (2004), *On Multi-Period Allocation of Tradable Emission Permits*, **FNU-43** (submitted)

Link, P.M. and Tol, R.S.J. (2004), *Possible Economic Impacts of a Shutdown of the Thermohaline Circulation: An Application of* FUND, **FNU-42** (forthcoming, *Portuguese Economic Journal*)

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